# [*User's Manual*]

**MSD600M**
**MSD600C-5.1**
**MSD600C-III**
**MSD200C**

**MASTER STEREO DISPLAY**
**Software Version 3.2**

**DK-AUDIO**

**www.dk-audio.com**

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AKM is a registered trademark of Asahi Kasei Microsystems Co., Ltd., Japan.

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Manual Revision 1.1, October 2002

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# 1. Introduction

Congratulations! By purchasing a Master Stereo Display (MSD) from DK-Audio you have decided to actually "See What you Hear!" We are certain that your Master Stereo Display will prove an invaluable tool in your daily work.

If you have any suggestions or points of view for future functions or options, we welcome your comments. Please write to DK-Audio at the address on the rear page of this manual, or call +45 44 85 02 55. You can also use the enclosed Registration Card to send us your remarks and observations. Your Registration Card is also the easiest way for you to receive up-to-date information from DK-Audio on future Master Stereo Display products. Please also check our website at: www.dk-audio.com

## 1.1. This Manual

To obtain higher software reliability plus a simpler way to ensure flawless software support, tracking and in-field software upgrade ability, all newer models of the MSD family have been designed around a single common operating system (OS). Under power-up each MSD informs the OS about which MSD and model number it is running on forcing the OS to configure itself according to the hardware and functions found on the actual MSD model.

To reflect this flexibility of the OS, this manual will describe all functions found in the OS with no regard to how many of the functions are actually available in your MSD model. Some functions in the Matrix Menu will vary from model to model because of the difference in the number and type of In/Out interfaces of the unit.

- If other functions besides the Matrix menu varies from model to model this will be described in the model specific Technical Manual.

**At date of print (2002) this manual covers the following MSD models: MSD600M, MSD600C-III, MSD600C-5.1, MSD200C.**

All trough this manual any of the supported models will be referred to simply as the MSD.

## 1.2. Audio Metering

In the audio industry, the most important tool used is the human ear. Producers, sound engineers and technicians rely on their hearing to create the desired audio, whether it be the accurate reproduction of an acoustic instrument, or an entirely new electronically-generated musical sound. Some people from many different fields within the audio industry are lucky enough to have what are known as "Golden Ears". It is a gift that allows them to be told all they need to know about the sound they are hearing. However, while the human ear is a highly sophisticated instrument, it is also very subjective and as such may well be misleading when it comes to engineering what is expected of a final audio product. Of course, if you do not have, or you do not believe in "Golden Ears", you may want help from other sources...

Visual information received through the eyes accounts for as much as 60% of all human senses. It is therefore an obvious advantage to be able to 'See What you Hear'. It is also a great way to confirm the opinions formed by your hearing. By being able to visualize the audio signal with the assis-

tance of various metering options, things that were previously extremely difficult or even impossible to hear, become obvious to the eye.

Until just a few years ago, level metering, phase indication and stereo image monitoring had been left to traditional instruments such as VU-Meters, bar graphs, LEDs, and oscilloscopes.
With the new Master Stereo Displays (MSD) from DK-Audio all of these functions and many others are now combined into one compact audio metering and monitoring workstation. The family of MSD's ranges over a broad pallet of versions, each designed to fulfil a specific need found in the professional broadcast-/audio industry.

**All MSD versions share the same basic functions:**

• The Correlation Meter displaying the average phase relationship between two audio signals

• The PPM Level Meter indicating the level of the signal on up to seven selectable international scales with peak and overload indication

• The Audio Vector Oscilloscope produces a visual picture of the audio signal thus making it easy to recognize mono or stereo patterns

• Add options such as Spectrum Analysers (FFT & 1/3 Octave), Surround Sound Monitoring (Jelly-Fish™), Session Log, Loudness, and Clock/Timer functions, and you have everything that you could possibly want from a complete metering system

# 2. Quick Start

The MSD is equipped with eleven user-definable presets for different applications. On delivery a given number of these will be pre-configured as factory presets, allowing you a quick and easy start.
Each MSD model will have its own set of factory presets reflecting the functionality of the specific model.

- It is recommended for first time users to start up your MSD session by recalling one of the factory presets

All the presets will be fully set with selected parameters such as inputs, PPM scales, oscilloscope modes (surround or stereo), reference levels and colour coding etc.
To access a preset function press **[PRESETS]** from the MAIN Menu, then select the required preset from the PRESET list by scrolling up/down with the arrow keys **[↓]**, **[↑]**. The highlighted preset (green), can now be entered by pressing the **[RECALL]** key.

Select the preset closest to your individual use of the MSD. The screen automatically adjusts to the selected number of PPM channels.

- For each MSD model a given number of the 11 user-definable presets is pre-configured as factory presets. Please refer to the appendix of the Technical Reference Manual for details regarding the available factory presets

The MSD is designed to boot from preset 0, BASE SETUP. It is therefore a good idea to save the preferred setting in this preset before you power off the MSD. In that way the MSD will always be ready to use. Preset 0 is not one of the factory presets but is programmed with a "logical" ready to use setting enabling the MSD to work right out of the box. The Original Base Setup can always be recalled from one of the unused presets labelled USER. From the factory these presets contain the same setting as the Base Preset.

A full detailed description of the MSD PRESET menu can be found in Section 9 'Preset Menu'.

# 3.  The Main Menu

The MAIN Menu shows three types of information simultaneously: the Phase Correlation Meter (or Phase Meter) (left), the Audio Vector Oscilloscope or surround sound monitor Jelly-Fish™ (centre) and the Peak Program Level Meter (PPM) (right).

Below the three main displays, is the Text Line menu that has eight corresponding multi-function soft-keys directly located underneath.

After Power Up or User Reset the MSD will always restart in the Main Menu configured as per the setting found in the preset 0, Base Setup.

*The Vector Scope or Jelly Fish™*

*The Phase Correlation Meter*

*The Peak Program Meter*

| INFO | MATRIX | PRESETS | SIG GEN | SETUP | 1/3 OCT | FFT | METER |
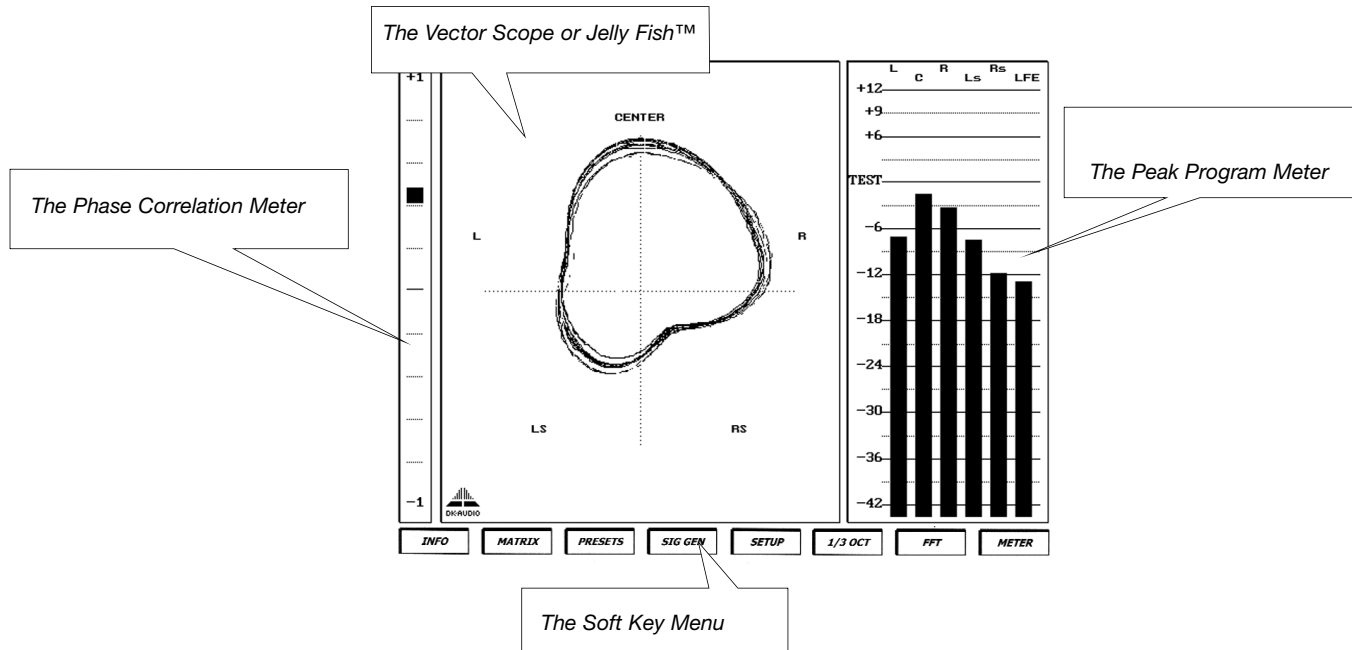
*The Soft Key Menu*

# 4. Operation –
## Navigating the MSD

The Soft-key Text line menu is the navigation tool of the MSD. The Operating System is designed in such a way that it enables each individual menu to have a set of Soft-keys specifically allocated for that menu.
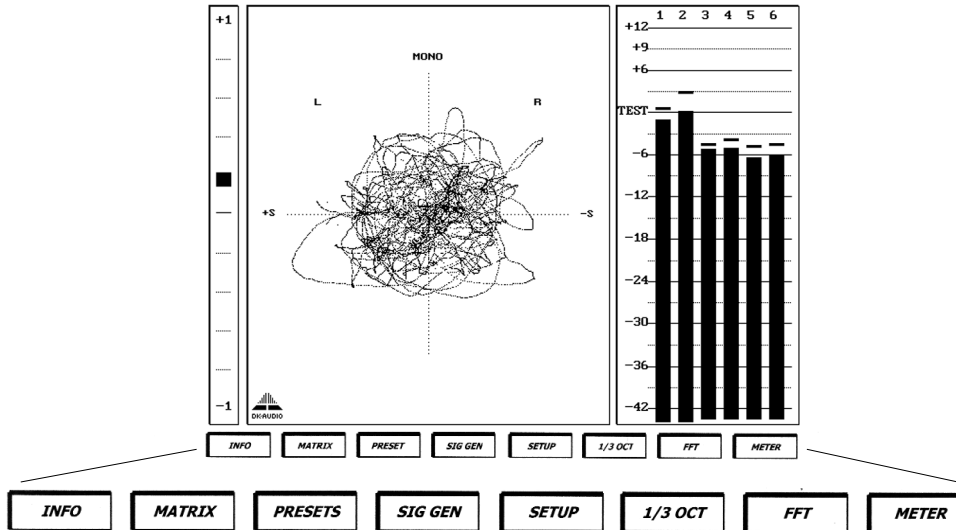
To return to the MAIN Menu or to return to a previous menu it is always possible to use the EXIT key (leftmost position).

Beside menu navigation the Soft-keys can also be used as "value" input tools.
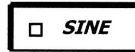
*Selection soft-key*  □ **SINE**          *Gain adjustment soft-key*  **GAIN** ▼

# 5. INFO Menu [MENU]

| INFO | MATRIX | PRESETS | SIG GEN | SETUP | 1/3 OCT | FFT | METER |

```
INFORMATION
DK-AUDIO A/S
MARIELUNDVEJ 37D
DK-2730 HERLEV
TEL +45 4485 0255
FAX +45 4485 0250
www.dk-audio.com

SERIAL NUMBER:-
SOFTWARE VER :3.2
HARDWARE VER :1.00
FIRMWARE VER :4
HARDWARE ID  :0100

INPUT MODULES
#1: (24) 4-AES
#2: (22) 2-AES
#3: (11) 1-AES 2-ANA
#4: (0) NOT INSERTED

OUTPUT MODULES
#1: (11) 1-AES 2-ANA
#2: (11) 1-AES 2-ANA
#3: (0) NOT INSERTED
#4: (GPIO) IO MODULE
```

The MSD is designed using so called FLASH-Memory technology. Besides holding the OS-software version this FLASH memory also stores other vital information used by the MSD.

In addition to being used as a product verification tool the information found in the **[INFO]** Menu is critical when it comes to updating the MSD with new features, as they are released by DK-Audio. Software updates are the most common way to enable new functions in the MSD. But in rare cases also the Firmware that configures the Hardware of the MSD can be updated, enabling new hardware functions not yet implemented. For information regarding the latest Software and Firmware versions please visit our website at: www.dk-audio.com

When contacting DK-Audio regarding costumer service questions please have the information found in this menu available. This will greatly help us with a fast and accurate response.

# 6. Write Protect [WR-PROTECT]

| INFO | MATRIX | PRESET | SIG GEN | SETUP | 1/3 OCT | FFT | METER |
|------|--------|--------|---------|-------|---------|-----|-------|

| EXIT | ☐ WR-PROTECT | | | | | RESET |
|------|--------------|
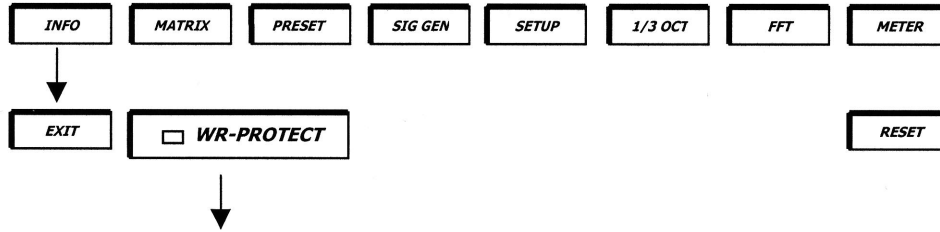
To avoid accidental changes to the presets the MSD is fitted with a WRITE-PROTECT function. Pressing the **[WR-PROTECT]** key toggles the indicator light. Red light indicates that the Write-Protection is ON. No indication means that the protection is off (ready for preset save).

The Write-Protect function is also used to prevent other critical functions to be changed by a mistake. One of those functions is the Meter Utility menu, Set Reference **[SET REF]** that sets the overall internal reference level.

If **[WR-PROTECT]** is On (Red light in the indication square) the **[SET REF]** menu will be grey and it will not be possible to enter the menu. This convention is followed for all functions that requires Write Protect to be disabled before any change can be made.

# 7. Software/Hardware Reset [RESET]

| INFO | MATRIX | PRESET | SIG GEN | SETUP | 1/3 OCT | FFT | METER |

| EXIT | ☐ WR-PROTECT |          RESET |
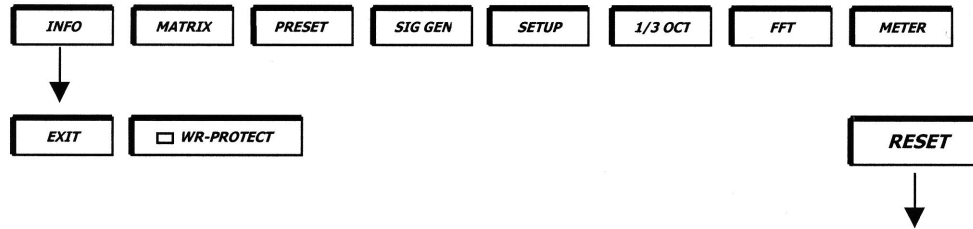
The RESET function works like a Power-up of the unit, generating a Hardware Reset followed by a total initialisation of all hardware and software related functions.

Just like after a power-up the **[RESET]** function will force the MSD to boot all settings from PRE-SET 0, Base Setup. Since the power supply for the MSD often will be placed "out of reach", the RESET function is a very handy way to force the MSD through a Power-up sequence.

In the event of concerns about the correct functionality of the MSD a RESET function may be preferred over a Preset recall. Since it is recommended to have saved the favoured settings in the PRE-SET 0, Base Setup, using the **[RESET]** function is a fast and safe way to get "back in business".

• Do not mistake this RESET function with the same named menu function under the METER UTILITY DMU-30 scale

# 8. The Audio Matrix [MATRIX]
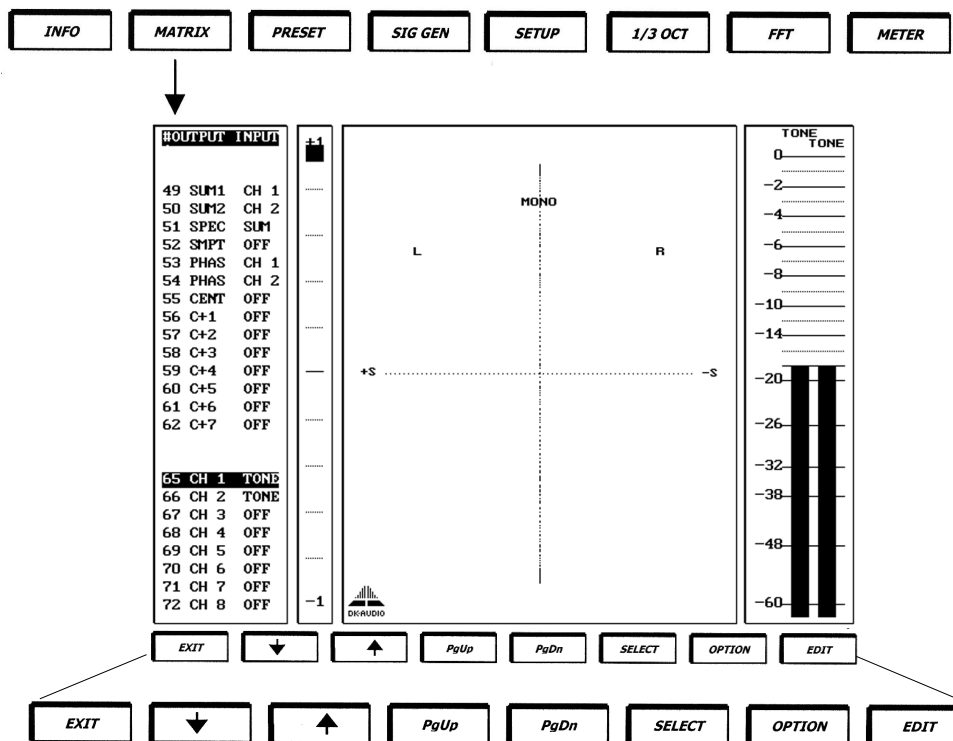
The Audio Matrix function has become the control centre of the MSD unit. Almost all the parameter settings are selected and internally routed via the matrix.

Upon entering the **[MATRIX]** Menu the Status List will show the current configuration of outputs and Inputs. The left hand column list the various functions with the Input "routed" at the right hand column.

The MSD always looks at the signal routing from a DESTINATION (output) point-of-view.
The destination/output column is permanently numbered from 1-96, with the source/input column permanently numbered from 1-88. However, only lines shown in WHITE can be selected based upon the number of available in/output for the specific MSD model. BLACK lines are therefore not available.

Almost all functions in the MSD are arranged in this large 88 (input) x 96 (output) Matrix.

Any input channel may be routed to any output, including separate left/right channels of an AES-3 stream. Therefore, you are not restricted to the routing of signal pairs.

All meter functions such as phase meter, audio vector oscilloscope, spectrum analyser and the PPM are considered "destination" outputs. So signals that have to be analysed must be routed via the Audio Matrix.

• A complete MATRIX flow-chart can be found in the Technical Reference Manual

The following example lists some of the Destinations Column for a specific MSD model. All Destination Names regarding physical Input/Outputs are set from the factory to reflect the specific MSD model. All Source/Destination names in the Matrix can be changed by the **[EDIT]** function found in the MATRIX Menu (will be explained later in this manual).

| Line # | Name | Destination (Output) | Line # | Name | Destination (Output) |
|--------|------|---------------------|--------|------|---------------------|
| 1 | DM1 | Reserved for future expansion | 53 | PHAS | Phase Meter CH 1 |
| 2 | DM1 | Reserved for future expansion | 54 | PHAS | Phase Meter CH 2 |
| : | | | : | | |
| : | | | : | | |
| 33 | ANA1 | Analogue Output 1 Left | 65 | CH 1 | PPM Selection (PPM bar no. 1 (from the left)) |
| 34 | ANA2 | Analogue Output 2 Right | 66 | CH 2 | PPM Selection (PPM bar no. 2 (from the left)) |
| 35 | AES1 | Digital Output 1 Left (Output module 1) | : | | |
| 36 | AES1 | Digital Output 1 Right (Output module 1) | 72 | CH 8 | PPM Selection (PPM bar no. 8 (from the left)) |
| : | | | | | |
| 49 | SUM1 | Sum/Difference Input 1 | | | |
| 50 | SUM2 | Sum/Difference Input 2 | | | |
| : | | | | | |
| 51 | SPEC | Spectrum Analyser (FFT and 1/3 band Octave) | | | |
| : | | | | | |

# 8.1 Navigating the Matrix, [↑], [↓],[PgUp], [PgDn], [SELECT]

| EXIT | ↓ | ↑ | PgUp | PgDn | SELECT | OPTIO | EDIT |
|------|---|---|------|------|--------|-------|------|
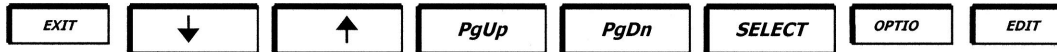
A very easy and straightforward strategy has been implemented to navigate the Audio Matrix.
Two Up/Down keys **[↑]**, **[↓]**, two Page Up/Down keys **[PgUp]**, **[PgDn]** and one **[SELECT]** key to select the highlighted column.

To assign an input to a specific output destination simply move the green highlighted column line using the arrow and page keys to the desired destination (output) and press the **[SELECT]** key. The Input Column menu will now open. Repeat the selection of the desired source (input) and press the **[SELECT]** key.

Output Column Line Number

Output Column Name

Input Column Line Number

Output Column Line Number

Phase Correlation Meter Input: PPM Meter#1
(The PPM Ch.1 is re-routed)

Surround Sound C+3 Input: PPM Meter Ch.4
(4+CENT selected Input resulting in a 5.1 format Jelly-Fish™)

Program Peak Meter Ch.5 Input: Rs Channel

```
#OUTPUT INPUT
47 AES4   OFF
48 AES4   OFF

51 SPEC   SUM

53 PHAS   CH 1
54 PHAS   CH 3
55 CENT   CH 2
56 C+1    CH 3
57 C+2    CH 5
58 C+3    CH 4
59 C+4    CH 1
60 C+5    OFF
61 C+6    OFF
62 C+7    OFF

65 CH 1   L
66 CH 2   C
67 CH 3   R
68 CH 4   Ls
69 CH 5   Rs
70 CH 6   LFE
71 CH 7   OFF
72 CH 8   OFF
```

```
# INPUT
39 AES2
40 AES2
41  Rs
42  LFE
43 AES3
44 AES3
45 ANA4
46 ANA4
47 AES4
48 AES4

51 OFF
52 OFF
53 TONE
54 TONE

57 CH 1
58 CH 2
59 CH 3
60 CH 4
61 CH 5
62 CH 6
63 CH 7
64 CH 8
```

Input Column Name

Physical Input Channel: Rs (Right Surround)
(Physical Format depending on MSD model)

Physical Input Channel: AES #4
(Only found on the MSD600M)

Output #1 from Built In Tone Generator

Output from PPM Ch-5.
(Even though a PPM is a Meter Function the Inputs to PPM's can be re-routed)

# 8.2 Matrix Options [OPTION]

Most functions in the MSD have one or more options relating to it. These options are mainly concerning the meter ballistics and the visual appearance.

The Phase Correlation Meter, Audio Vector Oscilloscope and Surround Sound Monitor share the same options while the PPM Meter has its own set.

In contrast to the Main Menu functions the two Spectrum Analysers supported by the MSD, the FFT and 1/3 Octave, are based entirely on settings found under there own respective menus and therefore do not use an option menu accessible from the Matrix.

## 8.2.1 Mono/Stereo Option [MONO]

```
┌──────────┐   ┌──────────┐
│   EXIT   │   │ □ MONO   │
└──────────┘   └──────────┘
```

The Option Menu for all the physical Output's selectable from the Matrix Output Column number 33-48.

When the **[MONO]** Key is highlighted (green) navigation in the Matrix Output Column is Channel-by-Channel based (Mono). When de-selected the navigation is based on all channels arranged in stereo pairs.

## 8.2.2 Phase Correlation, Audio Vector Oscilloscope and Jelly-Fish™ Option

**Menu for the Matrix Output column number 53-62**

| EXIT | □ SLOW | □ FAST | □ C-OFF | GAIN | ▲ 8 ▼ | SCOPCO |

Three of the main metering functions in the MSD are sharing one of the available Matrix Option Menus. These are the Phase Correlation Meter, the Audio Vector Oscilloscope and the surround sound Jelly-Fish™. To enter this menu, press the **[OPTION]** key when one of the Matrix Output column numbers 53-62 is selected.

### 8.2.2.1 Integration Time [SLOW], [FAST]

| EXIT | □ SLOW | □ FAST | □ C-OFF | GAIN | ▲ 8 ▼ | SCOPCO |

The Various Meter functions under the Option settings can operate in either FAST or SLOW mode.

Fast and Slow set the meter integration time.  Fast mode is without any integration, while the Slow mode is with a normal 10ms integration time.

When selected the small square green indicator is lit, shutting off the previously selected option.

**8.2.2.2 Meter Compression Function [C-OFF]**

| EXIT | □ SLOW | □ FAST | □ C-OFF | GAIN | ↑ | 01 | ↓ | SCOPCO |
|------|--------|--------|---------|------|---|----|----|--------|
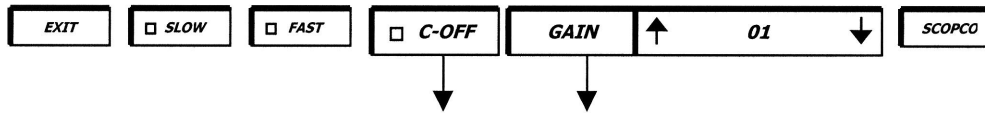
To obtain the best visual indication at all signal levels the Audio Vector Oscilloscope and Surround Sound Monitor is using dynamic scaling. This is done adjusting the Meter Input Gain stage right before the metering function. The auto-adjustments are done so that the average input level results in a metering display close to full-scale.

This auto-adjustment feature is also referred to as the Meter Compressor function or just C-OFF.

It is possible to turn this Meter Compressor function on and off. When the small square green indi-cator is lit, the compressor is off. The Meter Gain can be set in the range between +0dB and +30dB.

When C-OFF is selected it is possible to manually set the Input Gain stage otherwise used by the compressor.

• When the compressor function is in use it is important to note that the Audio Vector Oscilloscope and Surround Sound Monitor can not be used to monitor the actual signal level

### 8.2.2.3  Colour Select [SCOPCOL]

| EXIT | □ SLOW | □ FAST | □ C-OFF | GAIN | ⬆ | 8 | ⬇ | SCOPCOL |
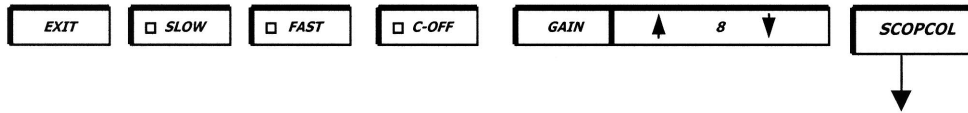
To select one of seven possible colours used by the Audio Vector Oscilloscope and Surround Sound Jelly-Fish™ press the **[SCOPCOL]** key and then choose the desired colour.

A small square green indicator shows the selected colour.

- The colour on the Phase Correlation Meter is always set to be green

## 8.2.3 Option Menu for the PPM presentation

| EXIT | ↓ | ↑ |
|------|---|---|

SELECT

To control the visual appearance for an individual PPM bargraph first select one of the output column line numbers from 65-95 and press the soft-key **[OPTION]**.

The colour and width can be set individually for each PPM channel. There are six colours to choose from (green, yellow, blue, magenta, light blue & white). The width of the bargraphs can be altered according to your display requirements. There are three bargraph widths to choose from (X WIDE, WIDE, NORMAL).

Selecting SPACE will enter a space between the last PPM bargraph and the one currently selected. This special presentation option is handy when displaying many PPM's in the Main Menu.

Use the Line Up/Down keys **[↑]**, **[↓]** to determine the bargraph width you require. Press the **[SELECT]** key to confirm the selection. Note: Bargraph width selections do not take place until

you have exited the Matrix Option menu and returned to the Main Menu.

To change colour of the PPM bars select the area you want to change: SET COLOUR, SET TRACK or SET UNDER. SET COLOUR determines the colour of the PPM bar itself. SET TRACK colour is the 'track' or background colour of the PPM bar (This would normally be selected black and thus be 'invisible'). SET UNDER is the PPM bar from the 'underload' mark to the bottom. To select a colour for the full length PPM, both SET UNDER and SET COLOUR must have same colours. After pressing the **[SELECT]** key at the selected area an option menu with six colours appears. Select one of the colours by the corresponding soft-key.

• Exit the Matrix Menu before all changes take place

```
┌─────────────────┐ ┌─────────────┐ ┌──┐ ┌──────────────────────────────┐ ┌──────────────┐
│#OUTPUT INPUT    │ │BARGRAPH     │ │+1│ │                              │ │     TONE     │
│                 │ │ □ X WIDE    │ │██│ │              │               │ │  0 ··········│
│                 │ │ ▣ WIDE      │ │  │ │              │               │ │              │
│49 SUM1   CH 1   │ │ □ NORMAL    │ │··│ │              │               │ │ −2···········│
│50 SUM2   CH 2   │ │ □ SPACE     │ │  │ │              │               │ │              │
│51 SPEC   SUM    │ │SET COLOR    │ │··│ │          MONO│               │ │ −4···········│
│52 SMPT   OFF    │ │SET TRACK    │ │  │ │              │               │ │              │
│53 PHAS   CH 1   │ │SET UNDER    │ │  │ │    L         │         R     │ │ −6···········│
│54 PHAS   CH 2   │ │             │ │··│ │              │               │ │              │
│55 CENT   OFF    │ │             │ │  │ │              │               │ │ −8···········│
│56 C+1    OFF    │ │             │ │··│ │              │               │ │              │
│57 C+2    OFF    │ │             │ │  │ │              │               │ │−10···········│
│58 C+3    OFF    │ │             │ │  │ │              │               │ │              │
│59 C+4    OFF    │ │             │ │──│ │ +S ··········│············ −S │ │−14···········│
│60 C+5    OFF    │ │             │ │  │ │              │               │ │              │
│61 C+6    OFF    │ │             │ │··│ │              │               │ │−20···········│
│62 C+7    OFF    │ │             │ │  │ │              │               │ │              │
│                 │ │             │ │··│ │              │               │ │−26···········│
│                 │ │             │ │  │ │              │               │ │              │
│65 CH 1   TONE   │ │             │ │  │ │              │               │ │−32···········│
│66 CH 2   TONE   │ │             │ │··│ │              │               │ │              │
│67 CH 3   OFF    │ │             │ │  │ │              │               │ │−38···········│
│68 CH 4   OFF    │ │             │ │··│ │              │               │ │              │
│69 CH 5   OFF    │ │             │ │  │ │              │               │ │−48···········│
│70 CH 6   OFF    │ │             │ │  │ │ ▂▄█          │               │ │              │
│71 CH 7   OFF    │ │             │ │  │ │ DK-AUDIO     │               │ │−60···········│
│72 CH 8   OFF    │ │             │ │−1│ │              │               │ │              │
└─────────────────┘ └─────────────┘ └──┘ └──────────────────────────────┘ └──────────────┘
┌──────┐   ┌──────┐ ┌──────┐                              ┌──────┐
│ EXIT │   │  ↑   │ │  ↓   │                              │SELECT│
└──────┘   └──────┘ └──────┘                              └──────┘
```
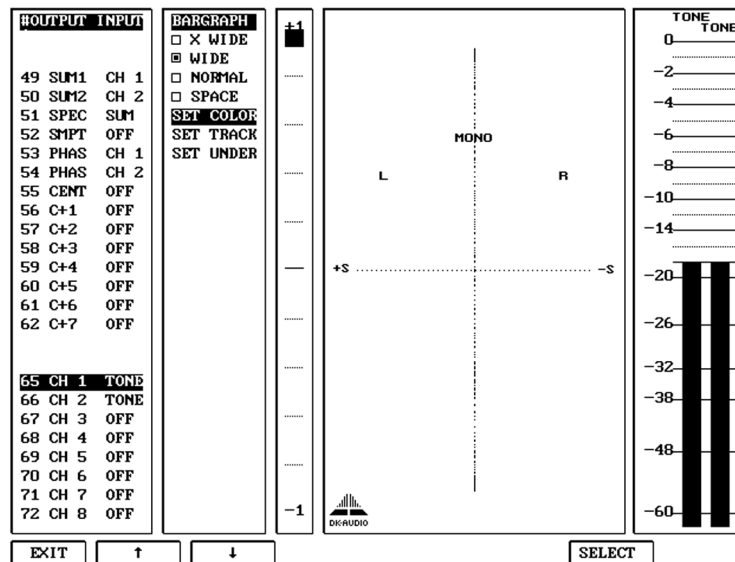
## 8.2.4 AES Input Option
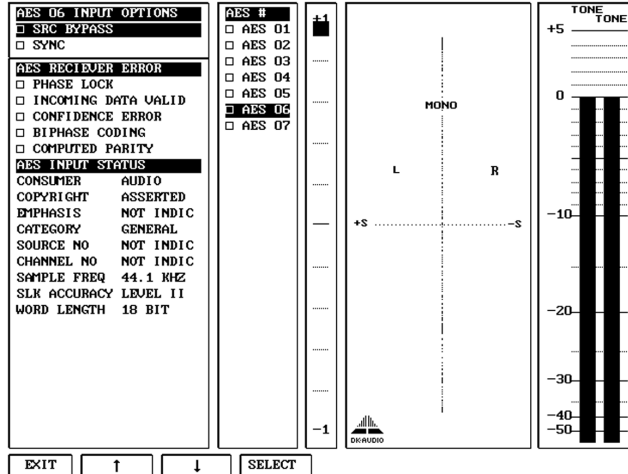
The AES Input Option Menu is not only used to control the relevant AES Input function, Sample Rate Converter Bypass (SRC Bypass) and External Sync source, but also an AES Receive and Status analyser.

The AES Option menu is a "sticky" menu. This means that the displayed Receive and Input statuses are not dynamically updated. The MSD reads the current status when entering this option menu and will update the displayed information only after re-entering the menu or pressing the **[CLEAR]** key.

Since the AES options are highly hardware dependant not all MSD models covered in this manual will support these functions.

### 8.2.4.1 SRC Bypass and External Sync

To bypass the Sample Rate Converter (RSC) on one of the AES Inputs or to force the MSD to synchronise to an external AES signal, first select the desired menu line using the arrow Up/Down keys [↑], [↓]. The selected line will be highlighted in a green colour. Open the underlying selection menu by pressing the **[SELECT]** key.

The SRC on all the AES Inputs can be individually bypassed. When bypassing a SRC it is important to remember that the incoming AES signal must be synchronised to the MSD. In most situations it is not recommended to bypass the SRC due to the risk of generating a synchronisation error. Such errors will generate full-scale "clicks" in the audio stream. Without audibly monitoring the measured AES signal, these clicks could be mistaken for a real audio signal.
The MSD will be delivered from the factory with the SRC on.

The MSD family has been designed to run on a fixed internal sample rate at 48 kHz. However, in certain situations it is required to synchronise the MSD against an external source. On the MSD600M this source can be an AES signal connected to the dedicated External Sync Input located on the Utility Module. On all other models supported by this manual it is possible to sync to any of the incoming AES signals.

Selecting an external synchronisation source will force the MSD to follow the sample rate of the sync signal. It is therefore important to ensure that the external sync sources sample rate do not exceed 48 kHz.

- On the MSD600M External Sync is selected from the SETUP Menu available directly under the Main Menu

Please refer to the Technical Reference Manual for more details regarding the use of external synchronisation and the SRC.

## 8.2.4.2 AES Receive Error

To verify the quality of the received AES Audio data stream the AES Input Option menu have been fitted with a set of indicators showing the basic receive conditions.
All the shown error conditions are directly read in hardware. For an AES signal reception none of the five error condition indicators must be lit.

In this menu the following conditions are monitored:

> Phase Lock error
> Valid Data
> Confidence Error
> Bi-phase coding error
> Parity Error

An in-depth technical explanation of the nature of these errors is beyond the scope of this manual.

• This function is not supported by all types of input modules for the MSD600M

**8.2.4.3 AES Input Status**

At the bottom part of the AES Input Menu you find the AES Input Status display. Here is the most common used AES embedded channel status bit displayed in decoded format.

The displayed Status bit information is as follows:

> Consumer/Professional Audio
> Copyright
> Emphasis
> Category code
> Source Number
> Channel Number
> Source Sample rate
> Source Clock accuracy level
> Audio Data Word length

An in-depth technical description of AES Channel Status bits is beyond the scope of this manual.

# 8.3 Matrix Label Re-naming [EDIT]

| INFO | MATRIX | PRESET | SIG GEN | SETUP | 1/3 OCT | FFT | METER |

| EXIT | ↓ | ↑ | PgUp | PgDn | SELECT | OPTIO | EDIT |

| EXIT | ↓ | ↑ | ← | → | COPY | PASTE | ENTER |
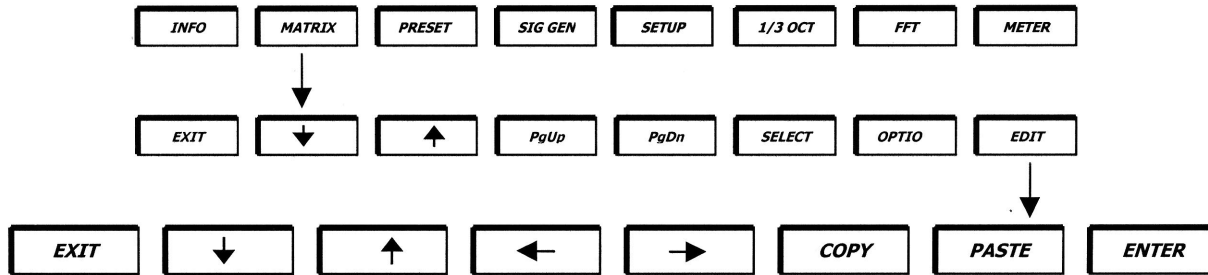
The EDIT function allows you to change the text names for the Matrix Input and Output channels using a copy and paste function, much like a word processor. Since changing the names in the Matrix is considered a critical operation, the WRITE-PROTECT function found in the INFO Menu, first need to be turned off. With WRITE-PROTECT still enabled it will not be able to enter Matrix EDIT Menu (It will be greyed out [EDIT]).

To EDIT the text name of a Matrix channel label first select the desired Matrix Column channel using the Matrix navigating tools. Then press the **[EDIT]** key, which will highlight the text in the selected line to a pink colour indicating that the EDIT function is now available. Each channel name can consist of a maximum of four alphanumeric characters.

The first character of the name will be highlighted by a flashing underscore. Select the new character in this position by stepping through the alphabet using the arrow Up/Down keys **[↑]**, **[↓]**. Use the arrow Left/Right keys **[<]**, **[>]** to select additional

character positions. When you have completed the
text edit, press **[ENTER]** to confirm. The text line
will change back to the green cursor colour and the
menu will return to the MATRIX window. Do not for-
get to return to the INFO Menu to put the WRITE-
PROTECT back on.

## 8.3.1 Text Copy/Paste Function [COPY], [PASTE]

| EXIT | ▼ | ▲ | ← | → | COPY | PASTE | ENTER |
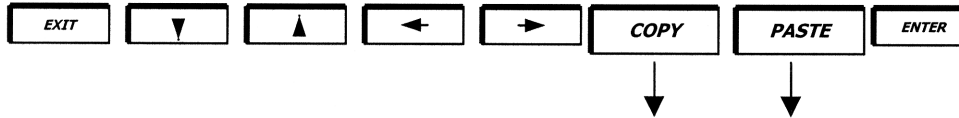
The Copy and Paste functions work in the same
way as they do in your Windows PC program, and
make it easy to copy multiple names from one line
to another. To use this function you must first set
the cursor on the Matrix Column line you wish to
copy from. Press the **[EDIT]** key and then the
**[COPY]** key. Now confirm your choice via the
**[ENTER]** key. To paste the copied text first set the
cursor to the desired Matrix column line, then
press **[EDIT]** followed by **[PASTE]**. Confirm with
**[ENTER]** and the operation will be completed. This
returns you to the MATRIX menu. Do not forget to
return to the INFO Menu to put the WRITE-PRO-
TECT back on.

# 9. Preset Menu [PRESET]
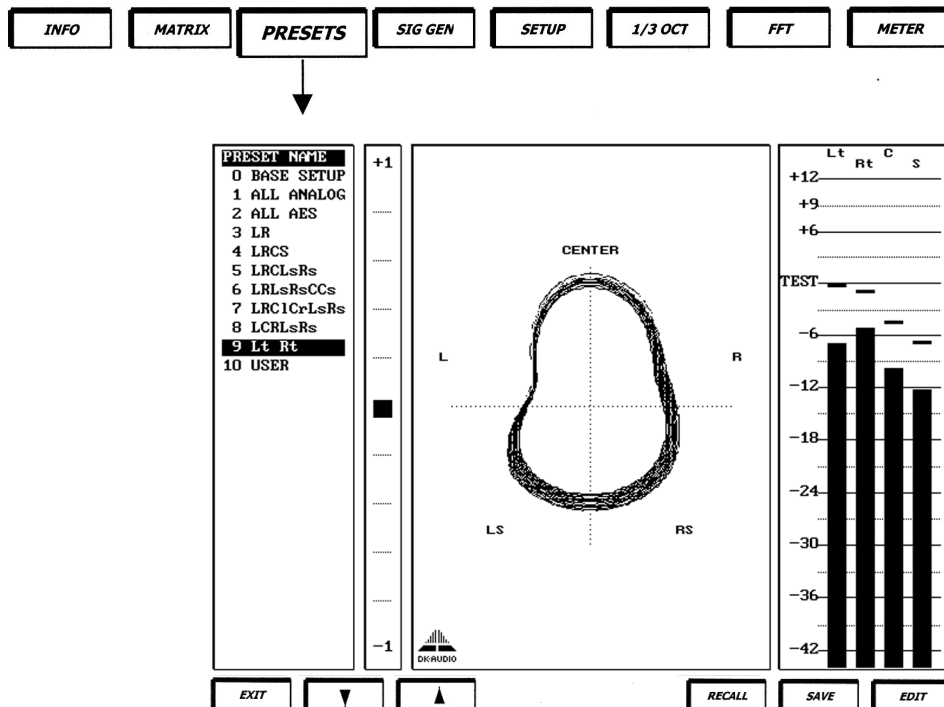
The presets are the easiest way to use the MSD in daily operation. By establishing a number of presets designed for your own applications and preferences, these can easily be recalled for a specific job. Instead of setting all the parameters individually for each new job, you just select the appropriate preset and you are ready to go. There are a total of eleven possible presets, all user-definable. Preset #0 is the Base Setup, which is the Preset used booting from power-up or after a RESET function. To avoid accidental change or erasure of the Base Setup Preset it can only be overwritten by a special procedure (described below).

Depending on the MSD model a certain number of the available presets are used as Factory Presets. The remaining preset locations will be used as USER PRESETS. (The first preset in the preset list will always be used as the Base Setup).

# 9.1 Preset Parameters

The following parameters may be stored in the eleven presets: cross-points (Matrix settings), source and destination names, PPM and scope trace colours, scales, PPM options, Ref. Levels and signal generator settings.

- For a total overview of all presets found in the specific MSD models please see the Technical Reference Manual for details

## 9.2 Recall a Preset [RECALL]

| INFO | MATRIX | **PRESETS** | SIG GEN | SETUP | 1/3 OCT | FFT | METER |

| EXIT | ▼ | ▲ | | | **RECALL** | SAVE | EDIT |
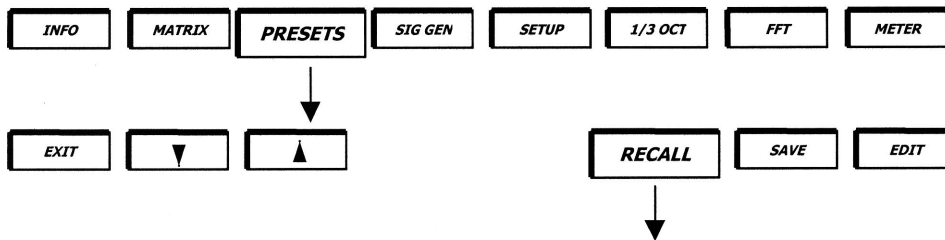
To select any of the eleven presets, go to the PRESET menu from the Main Menu. Select the desired preset number by using the arrow Up/Down keys **[↑]**, **[↓]**. The selected Preset will be highlighted by a green cursor. Press the **[RECALL]** key, and the preset has been selected.

When recalling a preset the MSD will return to the Main Menu.

# 9.3 Save a Preset [SAVE]

| EXIT | ▼ | ▲ |
|------|---|---|

| RECALL | SAVE | EDIT |
|--------|------|------|

To save all the current settings in a Preset you must first remove WRITE-PROTECT in the INFO menu.

Then go to the PRESET menu. Select the desired preset number (0-10) by using the arrow Up/Down keys **[↑]**, **[↓]**. Then press **[SAVE]** and the MSD will prompt you for acknowledgment **[YES]**.

When the YES key has been hit, the MSD will automatically put the WRITE-PROTECT back on.

When saving to Preset 0, Base Setup, the YES key must be held down for about 10 seconds. This is meant as an extra protection against undesired overwriting of the already existing parameters in this important preset location.

# 9.4 Edit a Preset Name [EDIT]

| EXIT | ▼ | ▲ |     | RECALL | SAVE | **EDIT** |

Just as it is possible to alter the Matrix Column Names it is also possible to alter any of the 11 preset names.
Please refer to section 8.3 "Matrix Label Re-naming [EDIT]" in this manual for a detailed description of how to use the EDIT function.

Remember to turn off the WRITE-PROTECT function in the INFO Menu before you can enter the EDIT Menu. Also do not forget to return to the INFO Menu and put back the WRITE-PROTECT when finished.

# 10. Signal Generator Menu [SIG GEN]

| INFO | MATRIX | PRESET | **SIG GEN** | SETUP | 1/3 OCT | FFT | METER |
|------|--------|--------|---------|-------|---------|-----|-------|

| EXIT | □ SINE | □ PULSE | □ EBU | □ R-WHT | □ R-PNK | □ P-WHT | □ P-PNK |
|------|--------|---------|-------|---------|---------|---------|---------|
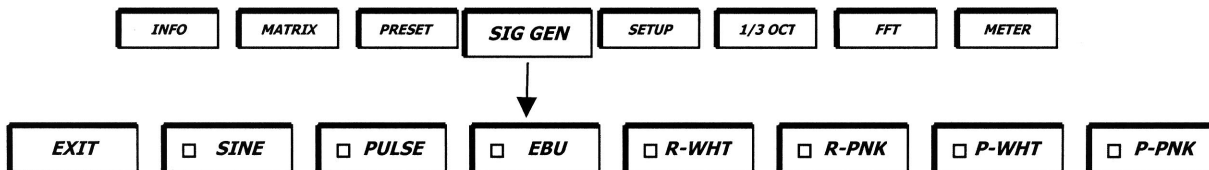
The SIGNAL GENERATOR menu controls all signal generator functions. To access this menu, press **[SIG GEN]** in the MAIN Menu.

• Note: The level and frequency for PULSE, EBU, Pink and White Noise Test signals are set via the SINE function

The Used Test Tone Signal Generator enables a low distortion tone to be fed into the Audio Matrix just like any other external audio signal. This means that the Signal Generator via the Matrix can be set to output a test signal on any physical output available on a given MSD model.

The Signal Generator shows up in the Input Matrix Column number #53,54 and can be treated just like any other source. In this way you can also feed the output from the Signal Generator directly to the PPM Meter or to any of the other functions found in the MSD. For MSD Models with no physical outputs it is still possible to use the Signal Generator as an internal test generator.

• The active Test Tone is indicated by the highlighted green square

## 10.1 Sine Wave Test Tone Generator [SINE]

To adjust the frequency and the amplitude for any of the test tones available enter the **[SINE]** Menu. Setting the frequency, is done by the arrow Left/Right keys **[<]**, **[>]**. The amplitude by the arrow Up/Down keys **[↑]**, **[↓]**. The frequency can be set in the range of 31 Hz to 19,952 Hz in predefined steps. The amplitude adjustments (measured in dBu) are made in steps of +/-0.1dB, but adjustment speed can be increased by a factor ten (+/-1.0 dB) by pressing the **[x10]** key. If active, the x10 indicator is lit.

## 10.2 Pulse Modulation Tone Generator [PULSE]

The PULSE function changes the sine wave signal from a tone generator into a 'pulse' (chopped sine wave). The 'ON' and 'OFF' duration times in millisecond increments is set with the arrow Left/Right keys **[<]**, **[>]** under the key labels **[ON xxxxMS]** and **[OFF xxxxMS]**. For instance, if you want the signal to be on for 10mSec, and then off for 20mSec, set the ON key to 10 and the OFF key to 20. Single millisecond increment adjustments are made by pressing these keys UP or DOWN individually. For greater increments, keep the key pressed down.

## 10.3 EBU Test Signal [EBU]

For radio, TV and video production the EBU test signal identifies the right channel of a stereo signal by switching the right signal off for 3 seconds, then on for 1 second. To enable this function in the MSD, press **[EBU]**. Please note that the tone signals must be selected in the proper LEFT/RIGHT order in the MATRIX Menu (Line #53 =LEFT and Line #54 =RIGHT).

# 10.4 Pink & White Noise Test Signals [R-WHT], [R-PNK], [P-WHT], [P-PNK]

The Test Tone Signal Generator is also able to generate both White and Pink Noise signals in two different implementations.

The Pseudo White Noise **[P-WHT]** and Pseudo Pink Noise **[P-PNK]**, are derived from impulse-signals with repeated-frequency spectrum content, while the Random White Noise **[R-WHT]**, and Random Pink Noise **[R-PNK]** are true random noise signals.

# 11. SETUP

| INFO | MATRIX | PRESET | SIG GEN | **SETUP** | 1/3 OCT | FFT | METER |

```
┌──────────────────────────────┐
│ SYNC STATUS                  │
│ □ EXT SYNC SELECTED          │
│ □ EXT SYNC ERROR             │
│                              │
└──────────────────────────────┘
```

*External Synchronisation Status Display.*

| EXIT |     | SYNC | LCD | SET REF |
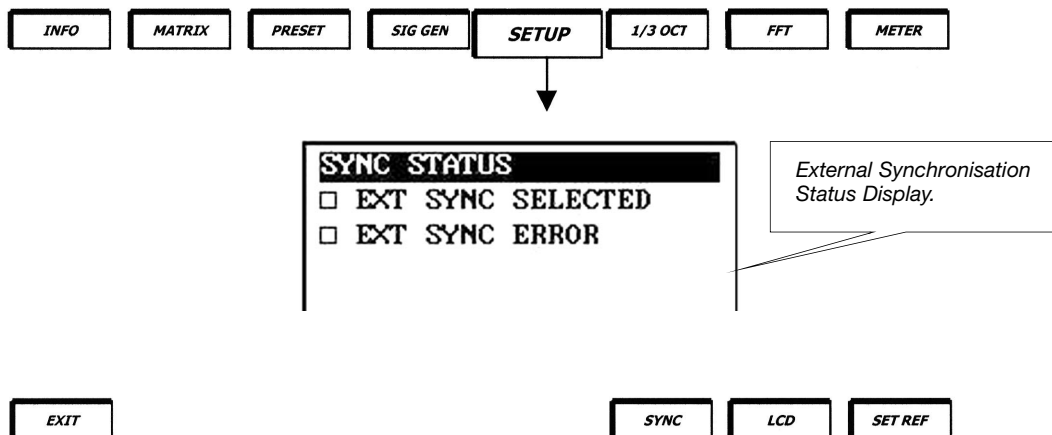
The SETUP Menu is one of the new menus found in Software Version 3.2. However the underlying functions, Back-Light and Set Reference, are well known functions from earlier versions.

When entering the SETUP Menu the External Synchronisation Status is displayed showing if External Sync is selected and if any External Sync Error has been detected.

- Only the MSD600M is using the shown SYNC Menu to select an External Sync source. For all other supported MSD models an external sync source is selected via the AES Input Option Menu (Please see section 8.2.4 in this manual)

Since the External Sync function heavily relies on the MSD's hardware configuration it may be required to update the units firmware as well as this software version to enable the function.

(Some older MSD600M models do not support the External Sync Function. On these models the SYNC Menu will not be available). Please visit our web-site www.dk-audio.com (tech support) for information regarding latest Firmware and Software versions.

# 11.1 Synchronisation – External/Internal [SYNC]

| EXIT |
|---|

As mentioned in section 11 the External Synchronisation menu is only supported by the MSD600M with the related Firmware/Hardware configuration.

When External Sync is enabled (green square highlighted) the MSD600M will try to sync up against the AES-3 signal on the specific External Sync Input integrated into the Utility DSUB connector. For more details please refer to External Sync flow chart in the Technical Reference Manual.

| □ EXT SYNC |
|---|

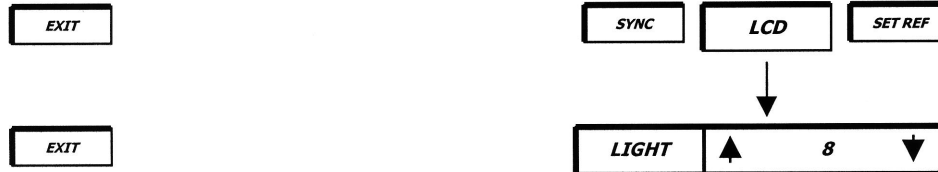When entering the SETUP Menu the SYNC STATUS Menu is shown informing if External Sync is selected, and if an External Sync error has occurred.

• An EXT SYNC ERROR alert will appear on the Vector Scope if a selected External Sync source is failing

For detailed information regarding the External Sync status it is advisable to use the AES-3 Input Option Menu  (Please see section 8.2.4 in the manual).

# 11.2 LCD (Back-Light) Menu [LCD]

```
┌─────────────┐                    ┌─────────────┐ ┌─────────────┐ ┌─────────────┐
│    EXIT     │                    │    SYNC     │ │     LCD     │ │   SET REF   │
└─────────────┘                    └─────────────┘ └─────────────┘ └─────────────┘
                                                          │
                                                          ▼
┌─────────────┐                    ┌─────────────┬─────────────────────────────┐
│    EXIT     │                    │    LIGHT    │   ▲         8         ▼      │
└─────────────┘                    └─────────────┴─────────────────────────────┘
```

To adjust the LCD display's brightness, enter the LCD menu by pressing the [**LCD**] key from the Main Menu. Adjustments are made by stepping the **[LIGHT]** arrow keys UP or DOWN. This will adjust the background lighting for the best possible clarity of viewing. Adjustments can be made from 8 (brightest) to 1 (least bright).

After making the above adjustment press **[EXIT]** twice to return to the MAIN Menu.

Since the Back Light setting is considered a crucial setting the WRITE-PROTECT must be disabled before it is possible to enter the **[LCD]** Menu.

# 11.3 Set Meter Reference [SET REF]

| EXIT | | | | SYNC | LCD | **SET REF** |

| EXIT | **AN-dB** | ↑ 0 ↓ | **DI-dB** | ↑ 0 ↓ |
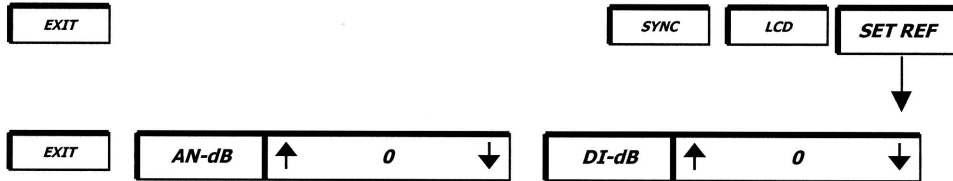
The Set Reference feature lets the user offset the internal factory calibrated reference used by the Program Peak Meters. There is a separate control for offsetting the Reference Level for both Analogue and Digital AES-3 Inputs. The **[AN-dB]** effecting all Analogue Inputs and **[DI-dB]** effecting all Digital AES-3 Inputs.

- The MSD is factory calibrated with AN-dB and DI-dB settings to match the regional standards for the used PPM scales. It is important to note that these norms vary from country to country

The SET REF Offset value will be added to the incoming signals to the PPM. A positive dB value will therefore result in the selected PPM Meter showing a 'higher' indication on the meter. It is important to keep in mind that it is the reference level of the meter that are 'moved', NOT the measured input signal that are higher!
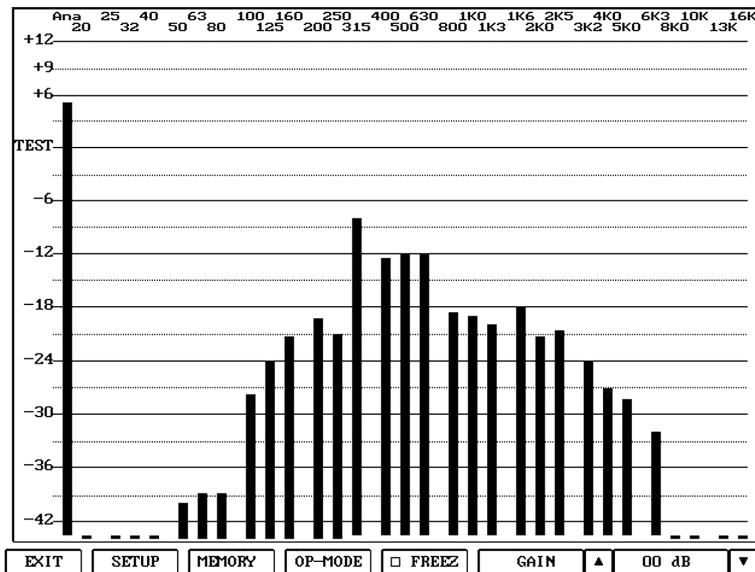
- Any modification of the Reference settings must be done only after careful consideration

Since the SET REF is considered a crucial setting the WRITE-PROTECT must be disabled before it is possible to enter the **[SET REF]** Menu.

# 12. Spectrum Analyser - 1/3 Octave [1/3 OCT]

| INFO | MATRIX | PRESET | SIG GEN | SETUP | 1/3 OCT | FFT | METER |

In the analysis of sound, it has always been important to describe the frequency content of a signal. Traditionally, this has been done using a filter bank containing a number of filters with relative bandwidths, for example 1/3 Octave. The signal being filtered passes through one filter at a time. Once the signal for a filter has been detected and its value determined, then the next filter is reviewed.
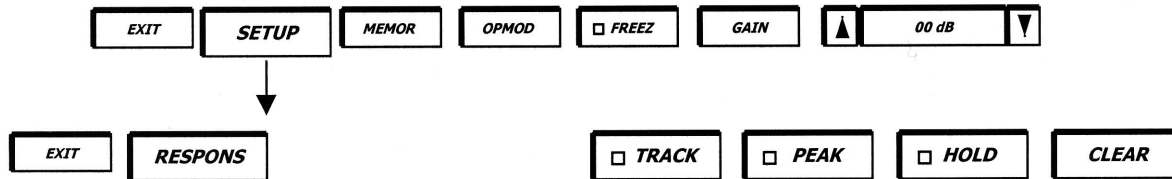
The leftmost bar on the 1/3 Octave Analyser (blue colour) is an input level indicator for the Analyser.

Since the Input signal contains the energy from all 30 bands combined, this bar will normally show a higher value than any of the separate 1/3 Octave bands.

To make it easier to separate the individual bands the 1 kHz band has been coloured yellow.

- Please see the FFT Spectrum Analyser section 13 for details regarding how to select the Input Source for the Analyser in the Audio Matrix

# 12.1 Ballistic Setup for the 1/3 Octave Analyser [SETUP]

| EXIT | *SETUP* | MEMOR | OPMOD | □ FREEZ | GAIN | ▲ | 00 dB | ▼ |
|---|---|---|---|---|---|---|---|---|

| EXIT | *RESPONS* | | □ TRACK | □ PEAK | □ HOLD | CLEAR |
|---|---|---|---|---|---|---|

To obtain improved flexibility of the 30 band 1/3 Octave Analyser it is possible to adjust several of the Meter Ballistics. Besides the Meter Response time it is also possible to set the Meter Peak/Hold functions.

- The leftmost bar on the 1/3 Octave Analyser (blue colour) is an input level indicator for the Analyser. Since the Input signal contains the energy from the entire 30 band combined, this bar will normally show a higher value than any of the separate 1/3 Octave bands

To alter the ballistics of the Analyser, enter the **[SETUP]** Menu under the 1/3 Octave Menu.

The analysers response time is set by the **[RESPONS]** Key. Pressing this key opens a new menu from where it is possible to enter the response time from 125mSec to 1000mSec (in 125mSec steps).
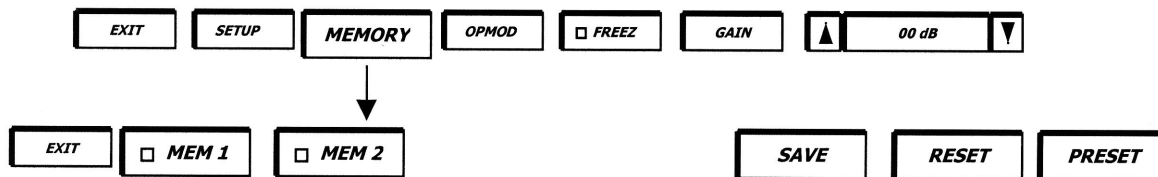
To measure the maximum output level from any of the 30 bands over time, the **[TRACK]** function combines this feature together with the standard display mode. When engaged the maximum output from each band will now be displayed as a purple coloured bar behind the normal 'live' bar (green colour).

Combined with or separate from the TRACK function the Analyser also have a normal "flying" peak indicator with a very long release time (holds the peak value approximate 2 seconds). The **[PEAK]** function can also be used in conjunction with the **[HOLD]** function enabling a classic Peak/Hold function. The displayed PEAK values can be Cleared by the **[CLEAR]** key. Both the HOLD and CLEAR functions can only be used when the PEAK function has been selected.

- All functions in the MSD that can be toggled on or off are implemented using a green or read coloured square inside the actual Key Frame. When selected ON this square will be lit

# 12.2 Measurement "Snap-Shots" of the 1/3 Octave Analyser [MEMORY]

| EXIT | SETUP | *MEMORY* | OPMOD | ☐ FREEZ | GAIN | ▲ | 00 dB | ▼ |

| EXIT | ☐ *MEM 1* | ☐ *MEM 2* | | | *SAVE* | *RESET* | *PRESET* |

Adding a Memory Function to the 1/3 Octave analyser greatly expands the usability of the analyser, giving the user the power of saving actual measurements and using these again as reference for new measurements. The MEMORY Menu has three main functions. SAVE, RESET and PRESET.

Using any of the saved measurements is done in the Operation Mode Menu OP-MODE (see next section).

To save a measurement, first select the memory number **[MEM 1]** or **[MEM 2]** to be used. Then press the **[SAVE]** key to store the current measure-

ment. The stored values are "SNAP-SHOTS" taken at the exact time the **[SAVE]** key has been hit.

Just like a preset the two Memory locations are saved in the FLASH Memory. The memories save the content even after a power down. When entering the 1/3 Band Octave Analyser these two Memory "presets" are loaded into the normal working memory of the MSD. This memory will however NOT be saved when leaving the Analyser. Since the SAVE function saves the measurement into this memory, any stored measurements done with this function will be lost when leaving the Analyser Menu.

As opposed to the SAVE function the PRESET function will save the snap-shot into the FLASH memory.

The SAVE function will normally be used when the two memory locations already contain valuable data used by the operator, and the need of an additional temporary snap-shot is present. In such a case, the SAVE function will temporary override the Memory locations, but only until exiting the Analyser Menu. When entering the Analyser Menu

again the FLASH saved memory snap-shots created by the PRESET will once again be ready for use.

To erase both saved FLASH memory locations press the **[RESET]** key.

- The Memory snap-shot currently used in the selected Operation Mode is the one highlighted in the MEMORY Menu

# 12.3 Operation Modes for the 1/3 Octave Analyser [OP-MODE]

| EXIT | SETUP | MEMOR | OPMODE | ☐ FREEZ | GAIN | ▲ | 00 dB | ▼ |

| EXIT | ☐ INPUT | ☐ I+MEM | ☐ I-MEM | ☐ TMEM |
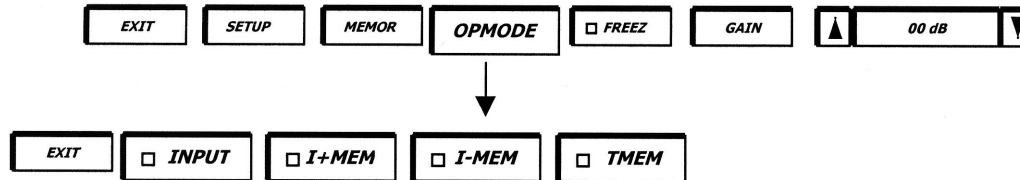
The 1/3 Band Octave Analyser can be operated in four different modes. Besides analysing the Input Signal specified by the Audio Matrix, it is also possible to modify the measured Input signal in relation to the two saved Memory snap-shots.

To use the Analyser in Normal Mode displaying the analysed results from the INPUT signal press the **[INPUT]** key.

Selecting the **[I+MEM]** or **[I-MEM]** results in displaying the current measured Input signal Added (I+MEM) or subtracted (I-MEM) with the selected Memory Location.

- To temporarily display the content of the selected Memory Location press the **[TMEM]** Key. This key can be used to verify any taken measurements

## 12.4 Using the Freeze and Gain Offset Function [FREEZ], [GAIN]

| EXIT | SETUP | MEMOR | OPMOD | ☐ FREEZ | GAIN | ▲ | 00 dB | ▼ |
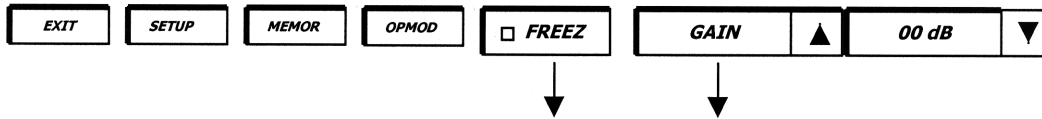
To momentarily freeze the Analyser display the **[FREEZ]** key can be selected. This function can be very useful when a non-continous Input signal have to be saved before further analysed, such as being modified with a measurement previously saved in one of the two memory locations.

To maximise the dynamic area of the Analyser the Input signal can be amplified up to +20 dB using the **[GAIN]** arrow Up/Down keys **[↑]**, **[↓]**. This function is mainly used for two different applications. One is to "normalise" a measurement in such a way that an actual measured average level for a specific band (or bands) is set to match a predefined level on the Meter Scale. An example is to set the GAIN until the average level of a given band is around the 0 dB mark on the scale. The Actual

measured average value can now be determined by subtracting the entered Gain value from 0dB.

Another useful application for the Gain function is to be able to measure very low level signals. Typically the noise level of a system. By applying the total of +20 dB Gain on the Input Signal it is possible to analyse signal levels down to 74 dBu.

- The scale used by the 1/3 Band Octave Analyser follows the one selected for the PPM Meter. Please see section 14.2 PPM Scales in this manual on how to change scale

- Please note that if using the VU and LEQ(m) scales which both have a very long integration time the 1/3 Octave Analyser will not work properly

# 13. FFT Spectrum Analyser
## [FFT]

| INFO | MATRIX | PRESET | SIG GEN | SETUP | 1/3 OCT | FFT | METER |
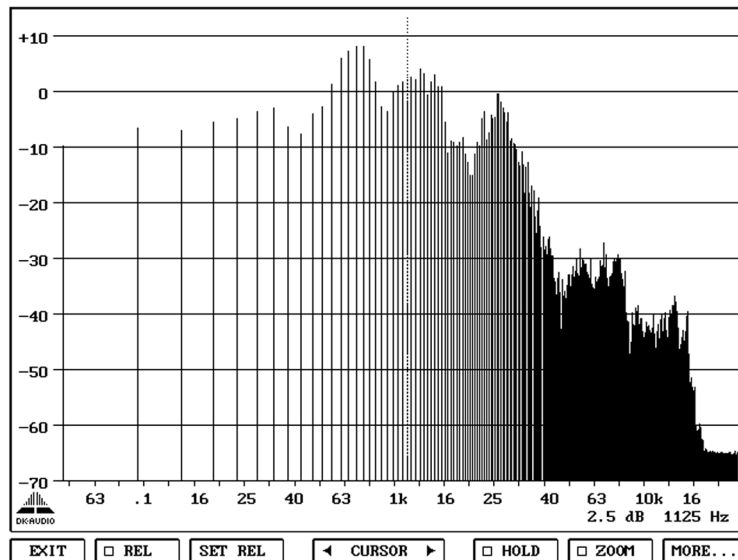
Most spectrum analysers used in sound engineering are based on analogue filtering techniques. For many years this has been the only practical solution for real-time analysers at a sensible size and cost. However, modern Digital Signal Processing (DSP) used by the MSD Family have made it possible to implement the complex FFT (Fast Fourier Transform) algorithm, which radically out performs its analogue counterpart many times over. For example, the number of frequency bands has been increased from the traditional 27 or 31, to a massive 512, and the dynamic range to 80 dB. These improvements make it possible to analyse noise, distortion (IM) and frequency response in a far more detailed and accurate way than ever before.

To enter the FFT Spectrum Analyser mode, select **[FFT]** from the MAIN Menu.
Frequency is indicated at the bottom of the screen from 48 Hz to 20 kHz, with signal level indicated on the left hand side in 10 dB intervals from –70 dB to +10 dB.

## 13.1 Routing Audio to the Analyser Section

Both types of Spectrum Analysers available in the MSD share the same Output Column number in the Audio Matrix (#51 spec). In that way when toggling between the 1/3 Octave and the FFT analyser it is not needed to set-up the Matrix more than once.

```
#OUTPUT INPUT      #  INPUT
47 AES4   OFF     39 AES2
48 AES4   OFF     40 AES2
                  41  Rs
                  42  LFE
51 SPEC   SUM     43 AES3
                  44 AES3
53 PHAS   CH 1    45 ANA4
54 PHAS   CH 3    46 ANA4
55 CENT   CH 2    47 AES4
56 C+1    CH 3    48 AES4
57 C+2    CH 5
58 C+3    CH 4
59 C+4    CH 1    51 OFF
60 C+5    OFF     52 OFF
61 C+6    OFF     53 TONE
62 C+7    OFF     54 TONE
```

*Output Column Number #51 assigns the Source (Input) to the 1/3 Octave & FFT Analyser.*

*Example shows that the output from the Sum/Difference Amplifier is used as source for the Analyser section.*

Like all other functions in the MSD routing Audio signals from and to these is done by the Audio Matrix. Using the navigation tools in the Matrix Menu, the INPUT to the Analyser Section (1/3 Octave & FFT Analyser) is selected from the Input Column Menu. When entering the **[SELECT]** key at the selected Input Column the Matrix is creating what is known as a cross point.

In the Technical Manual a full signal flow chart for the various MSD models is shown. A cross point in the Matrix can be created everywhere two signal lines are intersecting.

Attention must be paid to the PPM Output. All 32 possible PPM Inputs are fed back into the Matrix. In this way it is possible to use the PPM destinations as sources from the Input Column, 're-routing' an Input signal via a specific PPM to another function in the MSD. By using this feature the Matrix setup can be simplified by only assigning the physical Input to a single destination (the PPM) even though the same signal are used in several places. Please see the configuration of the applied factory Presets which all are using this type of PPM signal feedback.

## 13.2 Relative Offset Display [REL], [SET REL], [CURSOR]
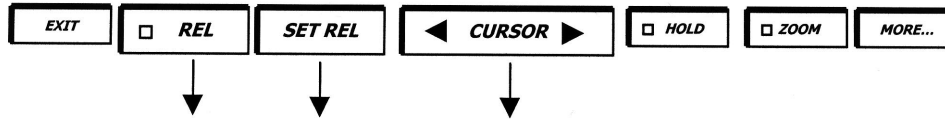


The Display Relative function works in conjunction with the Set relative SET-REL function and the CURSOR Select function.

When applying the display relative function, by the **[REL]** key, the MSD tries to shift the whole FFT curve up or down relative to the SET-REL Level until the cursor level reading is equal to zero dB. The relative level is defined as the measured Level at the cursor location at the exact time when pressing the **[SET-REL]** Key. Use the arrow Left/Right **[CURSOR]** keys **[<]**, **[>]** to select a specific bar of the FFT. The numeric frequency of the selected bar and the actual measured level is displayed in the bottom right corner of the FFT display.

The **[SET REL]** key will only manipulate the on-screen data and should generally not be used to raise a weak signal, since accuracy will be lost.

- The resolution of the spectrum analyser is far higher than that of the screen resolution. Consequently, not all analysis results are displayed directly on screen.
  However, the frequency cursor can be used to obtain this 'hidden' data since it will display the exact frequency resolution in the numeric field display. Note that the numeric readout corresponds to the selected function. The numeric values always follow the actual data on the screen, i.e. if any of the functions REL and REF have been selected the numeric readout will reflect this
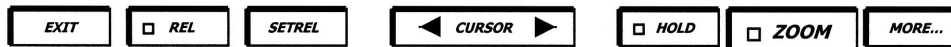
## 13.3 Hold Maximum Level [HOLD]

| EXIT | □ REL | SETREL | ◀ CURSOR ▶ | □ **HOLD** | □ ZOOM | MORE... |

The FFT HOLD function will disable the curve fall-back function, and thus show the maximum value of the level within each frequency band since the **[HOLD]** key was activated.
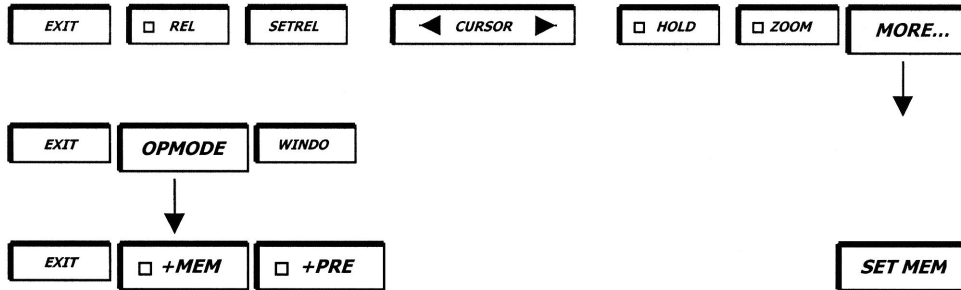
## 13.4 FFT Zoom Function [ZOOM]

| EXIT | □ REL | SETREL | ◀ CURSOR ▶ | □ HOLD | □ **ZOOM** | MORE... |

The full frequency range of the spectrum analyser can be changed by a factor of ten. This means that the display will alter from showing a range of 46 Hz to 23,531 kHz, to showing only the lower frequency range of 4 Hz to 2,353 kHz. When activating this function by the **[ZOOM]** key, a much more detailed look at the important low frequency signals is obtained.

# 13.5 Relative Memory FFT Measurements [OP-MODE]

| EXIT | □ REL | SETREL | | ◄ CURSOR ► | | □ HOLD | □ ZOOM | MORE... |

| EXIT | OPMODE | WINDO |

| EXIT | □ +MEM | □ +PRE |

| SET MEM |

The OP-MODE menu is used to display the spectrum analysis relative to a temporary or predefined reference curve. The relative display functions can all be active at the same time. To access the OP-MODE menu press the **[OP-MODE]** key.

When measuring against any of the two reference curves the FFT result is displayed relative to this curve, frequency bar by frequency bar. In that way if measuring an Input signal relative to itself, it will result in a flat response around 0 dB. (This is simply done by first pressing the **[SETMEM]** key follow by the [**+MEM**] key).

The memory function is sensitive to the Write-Protection setting. If Write-Protection is on the SETMEM can only be used for temporary storage only. The Analyser will loose the stored data each time the function is exited. This is very useful when making repeat measurements like the testing of room acoustics, loudspeakers etc. With Write-Protect Off the SETMEM function will save the reference curve in the MSD's FLASH memory saving the reference curve even after re-powering the unit.
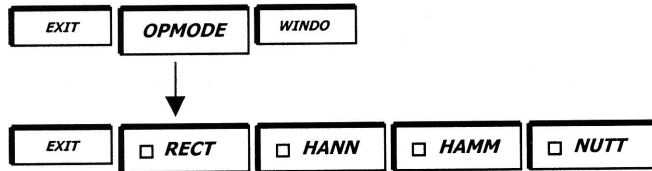
The Predefined reference curve **[+PRE]** is a pre-emphasis curve "lifting" the data readout with +3 dB/Octave, resulting in a visual appearance of a 1/3 Octave analyser.

This lift provides a closer relationship between the aural and the visual judgement of the musical audio spectrum.

- Both reference curves can be enabled at the same time

# 13.6 FFT Windowing Functions [WINDOW]

| EXIT | OPMODE | WINDO |
|------|--------|-------|

↓

| EXIT | ☐ RECT | ☐ HANN | ☐ HAMM | ☐ NUTT |
|------|--------|--------|--------|--------|

Since the spectrum analyser is based on the Fast Fourier Transform principle, the sampled audio data needs 'windowing' (An in-depth mathematical explanation is not possible within the scope of this manual, we would therefore recommend that a detailed explanation of windowing be retrieved from other technical literature. However, a basic explanation of the windowing concept is as follows):

After the Audio is sampled and entered in a digital buffer with 1024 stages, the data is processed by the FFT algorithm and finally the results are displayed. While the FFT is processing the 1024 samples, a new set of data is recorded. No data is lost. Since the 1024 samples used for these calculations are a window of continuous audio samples, the beginning and the end of the 1024 samples need some 'smoothing' in order not to develop erroneous results. This data smoothing is known as 'windowing'.

The MSD system is implemented with four different windowing functions listed below:

1) Rectangular Window **[RECT]**

Samples are multiplied by a factor of one (i.e. by themselves). This window function is merely a method of disabling windowing of the data. The Rectangular Window provides the highest selectivity, but the lowest dynamic range.

2) Hanning Window **[HANN]**

The Hanning Window is useful in most applications and should be selected as the default. The Hanning Window provides high dynamic range, but low selectivity.
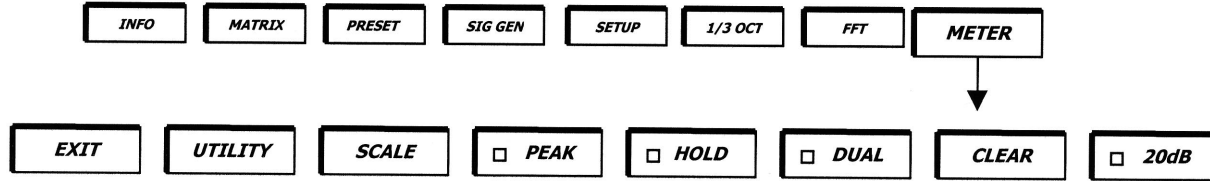
3) Hamming Window **[HAMM]**

The Hamming Window is ideal for applications where the requirement for the dynamic range is known. The HAMMING Window compromises between selectivity and dynamic range.

4) Nuttall Window **[NUTT]**

The Nuttall Window is especially useful for distortion measurements. The Nuttall Window provides the highest dynamic range and compromises the selectivity.

• The recommended window function for most applications is the HANNING window

# 14. Peak Program Meter [METER]

| INFO | MATRIX | PRESET | SIG GEN | SETUP | 1/3 OCT | FFT | **METER** |
|------|--------|--------|---------|-------|---------|-----|-----------|

| EXIT | UTILITY | SCALE | □ PEAK | □ HOLD | □ DUAL | CLEAR | □ 20dB |
|------|---------|-------|--------|--------|--------|-------|--------|

All control parameters used for the Peak Program Meter Display are located under the METER Menu making this Menu one of the most important in the system at all.

Press the **[METER]** key from the Main Menu and continue to the Utility or Scale Menu for selecting a required PPM scale/function. The PEAK, HOLD, DUAL and +20 dB functions are available directly from the PPM METER Menu.
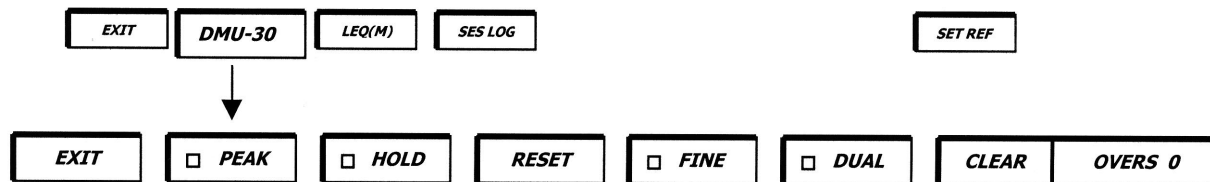
# 14.1 PPM Utility Functions [UTILITY]



On top of all the advanced metering and analysing functions and the flexible selection of PPM scales, which by it self makes the MSD a unique product, some extra have been added. At present time there are three such extra special functions. The DMU-30 Digital Audio Peak Meter, The LEQ(M), and finally a session log function.

## 14.1.1 DMU-30 Scale [DMU-30]

| EXIT | DMU-30 | LEQ(M) | SES LOG | | SET REF |
|------|--------|--------|---------|--|---------|

| EXIT | ☐ PEAK | ☐ HOLD | RESET | ☐ FINE | ☐ DUAL | CLEAR | OVERS 0 |
|------|--------|--------|-------|--------|--------|-------|---------|

The MSD600M has included the DMU-30 scale. To use the DMU-30 scale first select **[METER]** then **[UTILITY]**. This opens the UTILITY SELECTION menu from which you can select the [DMU-30] key. The DMU-30 scale is a Digital True-Peak scale with a range of 0 dB - 60 dB.

Just like any other scale selected from the SCALE Menu the DMU-30 scale offers PEAK, HOLD, DUAL and RESET functions (The DMU-30's RESET Function is equal to the CLEAR function used by any of the 7 internal scales).

The DMU-30 scale can be reduced by a factor of ten for accuracy by pressing the **[FINE]** key. Now the scale has a range of 0.0 dB - 6.0 dB. Because of the very high resolution LCD display used on the MSD's the actual "pixel" resolution is VERY high.

The top (full-scale) of the PPM Display when using the FINE function is depending on the Reference level indicated by a yellow line in the PPM Display when FINE mode is not active. See next section of this manual for details on how to set the reference level.

- The FINE mode differentiate from the standard DMU-2 scale by the capability of setting the Reference level. The DMU-2 scale reference level is fixed on digital full-scale

The OVERS function is a scaled down version of the same function found under the Session log Menu counting the number of times the Input samples are hitting the absolute digital limit (Digital Full-scale). To Clear and restart this counter press the **[CLEAR]** key.

## 14.1.1.1 Setting Reference and Overs for the DMU-30 Scale [REF], [OVERS]

| EXIT | DMU-30 | LEQ(M) | SES LOG | | SET REF |

| EXIT | REF | ▲ | 20 | ▼ | | □ FINE | OVERS | ▲ | 5 | ▼ |
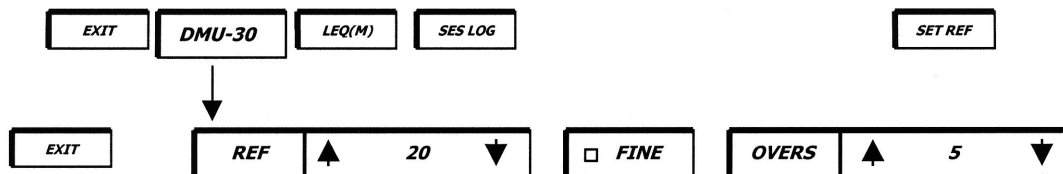
Setting the DMU-30 Reference level and OVERS Reference count number is considered a critical operation and therefore can only be done when the WRITE-PROTECT function is turned off.

To enter the Reference Menu first turn off the Write-Protect (found in the Info Menu) followed by selecting the **[DMU-30]** Key. In this way the **[DMU-30]** key have two different underlying menus depending on the status of the Write-Protect.

The DMU-30 Reference level, indicated by a yellow line in the DMU-30 PPM Display, is set by the

**[REF]** arrow Up/Down keys **[↑]**, **[↓]**. The Reference level can be set in 1 dB intervals in the range from –20 dB to 0 dB full scale.
This Reference level is used to decide the top (full-scale) of the FINE scale. In this way the **[FINE]** key is used to zoom into a selected area of the PPM display.
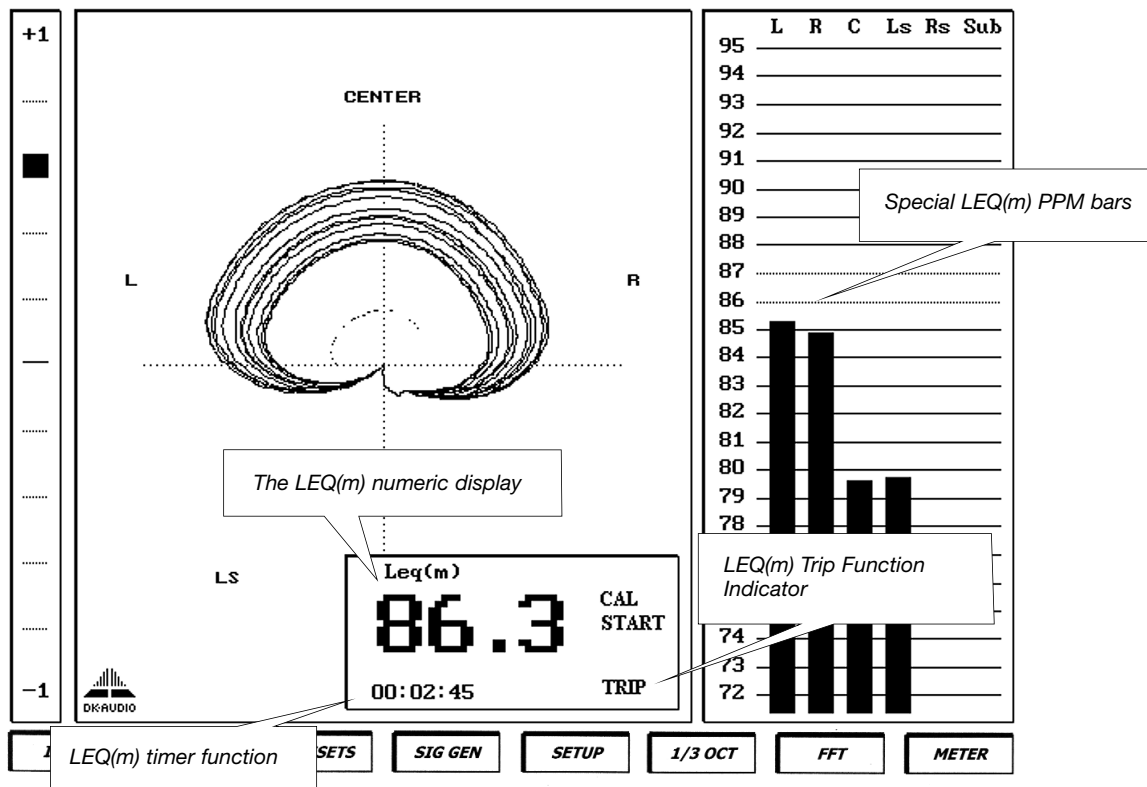
The OVERS Reference count number set by the **[OVERS]** arrow Up/Down keys **[↑], [↓]** determines how many continuous samples that have to hit digital full-scale before an OVER is registered.
In this way very short spikes hitting the digital full-

scale can be filtered out only leaving longer more damaging clipping to be registered. The OVERS can be set in the range from 1 to 15 samples.

- Remember to turn the Write-Protect ON after finishing any settings

- When leaving the MSD-30 Menu the MSD will change scale back to the one selected under the METER/SCALE Menu. To keep a DMU-30 PPM scale select the DMU-1 or DMU-2 scale from the SCALE Menu

## 14.1.2 The Loudness Scale [LEQ(M)]



*Special LEQ(m) PPM bars*

*The LEQ(m) numeric display*

*LEQ(m) Trip Function Indicator*

*LEQ(m) timer function*

A new standard is appearing in the film industry worldwide to maintain a uniform sound level for all movie theatres, and for all material including feature films, trailers and commercials.
To control this standard the Leq(m) loudness function is used.

The Leq(m) value is the true average (CCIR-468 weighted) of the audio power level of any signal passing through the meter. It is especially well suited to the film industry to determine the so-called "Soundtrack Annoyance", which is caused by excessive loudness levels during movie playback.

The Leq(m) software may be used on soundstages, optical recording, and film QA installations to audition final two- and six-channel mixes.

The Leq(m) is displayed on a special loudness "PPM" bar, as well as in a designated numerical display on the MSD screen. The value is shown in dB with three digits in the "00.0" format. The Trip function (Threshold, set under the LEQ SET Menu) will indicate when the signal exceeds the pre-defined maximum level by changing to a flashing red colour.

### 14.1.2.1 Setting the LEQ(m) [LEQ(M)]

| EXIT | DMU-30 | LEQ(M) | SES LOG |

SET REF

↓

| EXIT |

LEQ SET    START    STOP
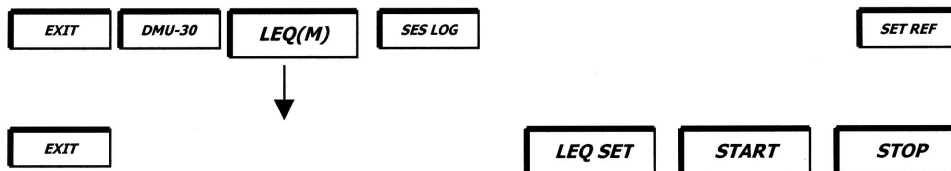
To use the Leq(m) scale enter the METER/UTILITY Menu. This opens the UTILITY Menu from which you can select the **[LEQ(M)]** key. The scale is now the linear loudness scale with a range of 72-95 dB, and a separate window with the reading in digital figures in the "00.0" format appears. The LEQ(m) display also has TIMER (hh:mm:ss), CAL, START/STOP and TRIP functions.

| EXIT |
| --- |

| LEQ SET | | EXIT | | EXIT |

| EXIT |
| --- |

| TRIP | ▲ | 78 | ▼ |

| CAL | ▲ | 2 | ▼ |
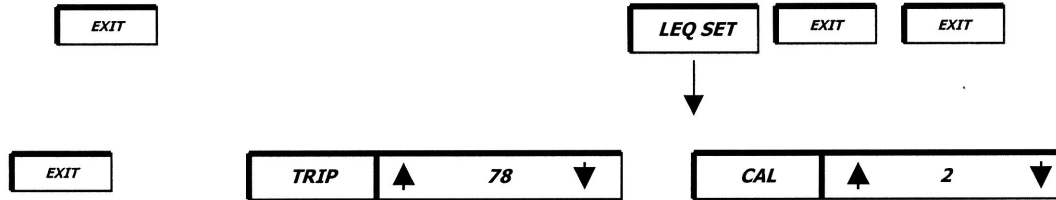
To set the **[TRIP]** (overload threshold) and the Calibration function **[CAL]**, enter the **[LEQ SET]** Menu. Both functions are set by the arrow Up/Down keys **[↑]**, **[↓]**.

The TRIP overload threshold refers to the TRIP indicator found on the LEQ(m) numeric display.

When the Measured LEQ(m) value exceed the TRIP threshold the TRIP Indicator will turn red, clearly indicating that the LEQ(m) level has exceeded the selected maximum level. As an example, typical loudness level for a movie the-atre would be 85 dB. The TRIP Threshold can be set in the range from 78 to 93 dB.

### 14.1.2.2 Calibrating the LEQ(m) [CAL]

The LEQ(m) measurement is meant as a way to measure the absolute sound pressure over time in a controlled acoustic listening environment where the direct relation between the electrically measured audio signal and the actual acoustic sound pressure are known.

The LEQ(m) measurement is based on a CCIR-468 modified weighting filter emulating the frequency response for the human ear.

Since the LEQ(m) measurement is based on a acoustic system the electrically measured signal level is converted to an energy level. This means that contrary to an electrical signal where a doubling in energy is equal to 6 dB, an equivalent doubling measured by the LEQ(m) is equal to 3 dB.

Because of this pseudo-acoustic system, the LEQ(m) have to be calibrated against a known signal level. For this matter it is specified that a 85 dB 1 kHz sine wave must be used as a reference level (400 Hz when calibrating up against a LFE Surround Sound Channel). To calibrate select the PPM channel to measure the reference signal with (Selected by the Up/Down keys **[↑]**, **[↓]** next to the CAL function) and press the **[CAL]** Key.

The calibration process takes approximately 15 seconds. During this time, the LEQ(m) Display will show **[15]** in the numeric data field and count down to zero while calibrating. Calibration of the selected channel is now completed.

- To be able to enter the LEQ(m) Calibration function Write-Protect must the turned off. Remember to turn Write-Protect back on when leaving the Calibration Menu

### 14.1.2.3 Using the LEQ(m) [START], [STOP]

EXIT

LEQ SET | START | STOP

After selecting the LEQ(m) scale, start measuring LEQ(m) over time by pressing the **[START]** key. When the necessary measurement time has elapsed (time shown on the timer in the LEQ(m) display) press the **[STOP]** key.

• When leaving the LEQ(m) Menu the MSD will change scale back to the one selected under the METER/ SCALE Menu. To keep the LEQ(m) scale it must be selected from the SCALE Menu

Attention must be paid to the last PPM bar, which always will be used as a LFE Channel. This channel is internally filtered through a 400 Hz low-pass filter.

• By using the I/O Remote Module (IO23) for the MSD600M it is possible to remote control several of the LEQ(m) functions

## 14.1.3 Session Log [SES LOG]

| EXIT | DMU-30 | LEQ(M) | **SES LOG** | | **SET REF** |

```
SESSION LOG                    hh:mm:ss 00:00:25
STOP

RESET

DK-AUDIO MSD600M Session Report

Title:
Date:
Time Code Source: OFF
Logging Interval (sec): 60
Starting Time:   00:00:00
Ending   Time:   00:00:00
Elapsed  Time:   00:00:00
Max Rec  Time:   04:00:00

Settings:
Number of Channels: 6
Scale Type:  I
Full-scale samples for over:  5
Milliseconds for a mute [ms]:   3
Upper limit for a mute [dB]: -70

Overs Found:  0
Mutes Found:  0

Session Time Stamped Information
```

+1
+12
+9
+6
TEST
-6
-12
-18
-24
-30
-36
-42
-1

L  R  C  LFE  Ls  Rs
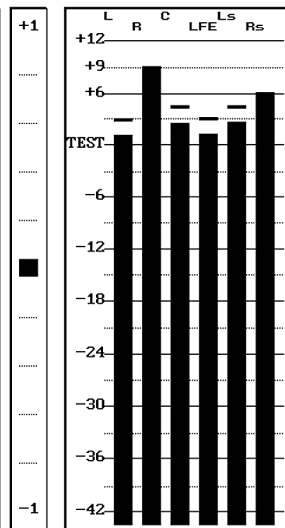
| EXIT | | ↓ | | PgDn | SELECT | ◄SCROLL | SCROLL► |

| EXIT | ↓ | ↑ | PgUp | PgDn | SELECT | SCROLL | SCROLL |

The MSD'S Session log records can be viewed on the main screen of the unit, or can be printed out to a connected printer via the RS232 interface found on the Utility Module at the rear of the cabinet (Depending on MSD Model). When entering the Session Log menu by pressing the **[SES LOG]** key the Session log Display will open displaying the following information: Session Title & Date, Time Code Source, Logging Interval (seconds), the Start, End, Elapsed and Maximum Recording times during the session. The display also shows: the Number of Channels used, Scale Type, Selected number of full-Scale Samples for over samples, Milliseconds for a mute, the Upper Limit for a mute in dB, the number of Over samples and Mutes found.

Navigating in the Session Log Menu follows the same rules as for the Audio Matrix (and for that matter everywhere in the MSD software). Two Line Up/Down keys **[↑]**, **[↓]**, two Page Up/Down keys **[PgUp]**, **[PgDn]** and one **[SELECT]** key to select the highlighted column. In addition a **[SCROLL]**

function have been added enabling scrolling through long data text lines.

The lines in the Session Log Menu that contain parameters that can be altered by the **[SELECT]** key will be highlighted. Then when pressing the **[SELECT]** key the selected line will turn into a purple colour and a set of Up/Down keys **[↑]**, **[↓]**, will appear in the soft-key menu.

The Session Log Display has been divided up into several smaller sections. These sections are as follows:

1) Session Log Main Controls

2) Timing information

3) Settings

4) Result

5) Time Stamp information

### 14.1.3.1 Using the Session Log [STOP], [PRINT], [RESET]

Starting a Session log is simply done by selecting the **[SES LOG]** key from the SCALE, METER, UTILITY Menu. The Session log will start logging right away. Stopping the Logging or Resetting (Re-Starting) is simply done by selecting the corresponding line with the green cursor and pressing the **[SELECT]** key.

For each Session Log activity the Recorded data is saved in the MSD's internal data memory. By selecting the PRINT function this record will be printed out to a printer if one is connected to the serial RS232 connection on the MSD unit.

- To Exit the Session Log Menu, press the **[EXIT]** key, followed by the **[YES]** key to confirm

### 14.1.3.2 Session Log Timing Information

All Audio input signals that can course a Trigger event will be recorded.
The Session Log function can be set up to record the highest measured signal level, any Digital full-scale event (Overs) and any Mute events that have happened between each record. When a record time is over (Logging Interval have been reached) the result is displayed at the bottom of the Session Log Display. To make it possible to trace when each record is made a Time Stamp is attached to each record.

The Time Code used by the Time Stamp function can be selected either using an internally generated Time Code or the output from the SMPTE time code reader. The selected source to the SMPTE time code reader is listed under the "Time Code Source". When the source is selected to OFF the MSD will generate an internal Time Code that will be used by the Session Log Function.
To select between an internal or an external time code enter the Audio Matrix and select an Input source to the SMPT output Column (#52). If the

selected Input is not a Time Code encoded signal the SMPTE code reader will turn off. To start the internal Time code generator select the Input column OFF (line # 51,52).

The Logging Interval time can be set in the range of 1 second to 240 seconds (4 minutes).

Underneath the Logging Interval is listed relevant logging information including Starting and Ending time, Elapsed Time and the Max available logging time. The maximum logging time is limited by the MSD's internal available data memory, the selected Logging rate and numbers of channels selected. The longer time between each logging the longer maximum Logging time. For a two channel system with a logging time set to one minute (60 Seconds) the Maximum logging time will be 12 hours equal to 720 records.

- The Title and Date Information Line is meant to be filled out by the user if the Session Log is printed out

### 14.1.3.3 Setting of the Session Log Trigger Events

As mentioned the Session Log is checking if any of the two available events have been triggered between each Logging Interval.
The Session Log will look at all (max 8) the channels selected in the PPM Display.

- The selected Scale used by the PPM is listed under the Scale Type

The two Trigger Events are Digital Full Scale (also known as Overs) and periodic signal Mutes.
The number of Overs required to trigger an event can be set from 1 to 15 and filter out short peaks by only triggering on longer events where the signal is clipping. If all Overs should be triggered just set the trigger event to 1.

For the mute trigger event it is possible to set a threshold, which the signal must be below before it can trigger an event. In addition to that the Period
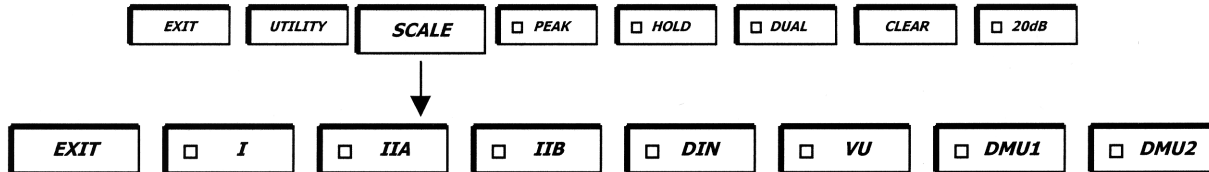
of time in which the signal is under this threshold can be set. In this way short breaks in music or in an interview can be filtered out, only allowing longer muted periods of the Input signal to trigger the event. The Mute threshold can be set in the range of -80 to –40 dB. The muting time can be set from 1 to 20 mSec.

### 14.1.3.4 Session Log Record Displaying

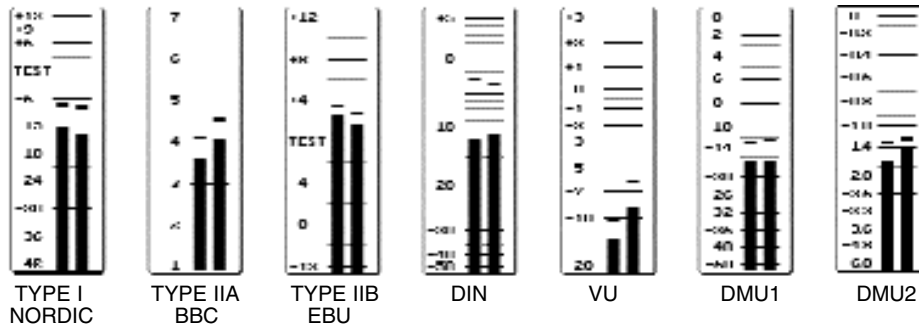The results are displayed at the bottom of the Session Log Display.

First the total number of Overs and Mute events recorded from all the PPM channels are displayed. Below this information follows the actual Session Log Record. At the leftmost side a time stamp have been added to the record making it easier to read and compare with the input source material.

## 14.2 PPM Scales [SCALE]

| EXIT | UTILITY | **SCALE** | ☐ PEAK | ☐ HOLD | ☐ DUAL | CLEAR | ☐ 20dB |

| **EXIT** | ☐ I | ☐ IIA | ☐ IIB | ☐ DIN | ☐ VU | ☐ DMU1 | ☐ DMU2 |

Please study the following reference reports to obtain the complete set of specifications: The IEC268-10 Peak Program Level Meters, The DIN 45406 and The Pflichtenhefte 3/6, The IEC 268-17 VU Meter, The Nordic N9, The CCIT Report 292-2 and BS6840 Part 10.

Illustrations below show some of the most common international standard scales (Matching the soft key example above!):

TYPE I NORDIC    TYPE IIA BBC    TYPE IIB EBU    DIN    VU    DMU1    DMU2

## 14.2.1. PPM Peak and Peak Hold [PEAK] [HOLD]

| EXIT | UTILITY | SCALE | **PEAK** | **HOLD** | □ DUAL | CLEAR | □ 20dB |
|------|---------|-------|----------|----------|--------|-------|--------|
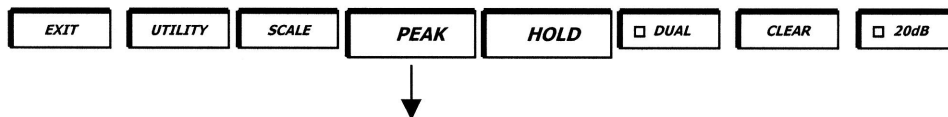
The PEAK function activates the "flying" peak indicators above each PPM bar. To toggle this function on/off press **[METER]** then the **[PEAK]** key. This function works closely with the Peak HOLD function described below. The peak indicators will remain at their highest peak value for two seconds, then either fall back or go to a new highest level.

The Peak HOLD function will allow you to check the maximum signal level during, or especially after, the recording session. Thus you can secure that the level does not exceed any pre-determined limits. To select Peak HOLD, press first the **[METER]** key, then **[PEAK]** and **[HOLD]**. Then toggle the HOLD function on/off by pressing the **[HOLD]** key.

In the HOLD mode, the "flying" segments on the PPM bars will indicate the highest bargraph value since the last hold reset.

## 14.2.2 Dual Peak Indicators [DUAL]

| EXIT | UTILITY | SCALE | □ PEAK | □ HOLD | □ DUAL | CLEAR | □ 20dB |

It is possible to show the PPM meter with two different ballistics for the same signal. While the selected scale with its standard PPM peak indicators will retain its original ballistics, another set of PPM peak indicators will show the true digital peak (regardless of the selected scale).

To select the dual ballistics function press first **[METER]** then **[DUAL]**.

The true digital peak indicators may be selected without the normal peak indicators, and this in fact may be advisable for most applications.

## 14.2.3 Input Gain [20dB] and Clear function [CLEAR]

| EXIT | UTILITY | SCALE | □ PEAK | □ HOLD | □ DUAL | CLEAR | □ 20dB |
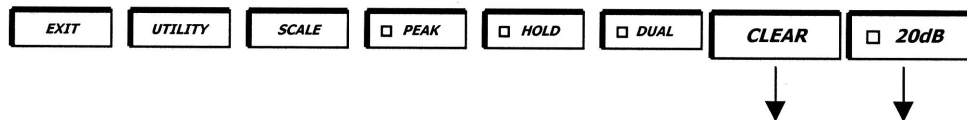
When using the Peak/Hold function it is very useful to be able to clear the display so a new measurement can be started. To do this, press the **[CLEAR]** key.

The input sensitivity of the PPM meter can be increased by +20 dB. From the MAIN DISPLAY window, press the **[METER]** key. Now press the **[20 dB]** key. This function is used to obtain the best possible dynamic range and accuracy of measurement from weak signals. A red +20 indicator in the top left corner of the PPM meter display indicates that this function is ON.

# 15. The Phase Correlation Meter

The Phase Correlation meter is the extreme left-hand display in the MAIN DISPLAY. The Phase Correlation meter is of the so-called "Centre-Zero" type, and displays the phase relationship between the two input signals. A stereo signal will ideally show **[0]** which is random distributed phase, and therefore the maximum ambient effect. Mono will indicate **[+1]**, and a signal with reversed phase components will indicate in the range **[0]** to **[-1]**. When the indicator moves into the negative or "non mono-compatible" area it will change to red for easy identification. Any signal pair can be monitored on the phase meter.

• You should never allow negative indication if your signal is going to be reproduced in mono

Input signals below a predefined threshold will force the indication towards zero. This is done because the Phase content of very low level signals is insignificant. It is important to remember that only major phase components are considered.

To select the source(input) for the Phase Correlation Meter, press the **[SELECT]** key in the Output Audio Matrix column line #53,54 (PHAS).



*Random Phase*          *MONO*          *Reverse Phase*

*Centre Line*
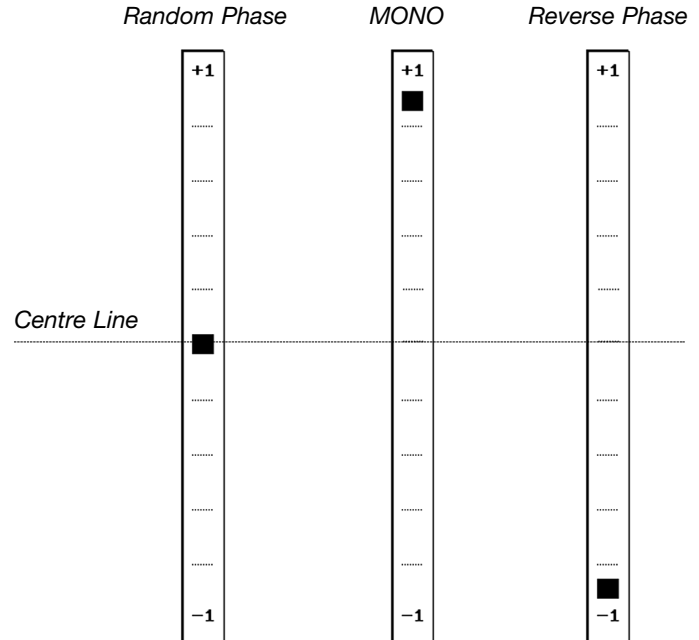
# 16. Audio Vector or Surround Sound Monitoring

The middle display in the Main Menu has dual functions. Either used as an Audio Vector Oscilloscope or as the Jelly-Fish™ Surround sound monitor.

The appropriate display is selected depending on the Matrix setting.

When an active source setting (Inputs) have been selected for the Surround sound monitor (Column line #55-62 in the Audio Matrix menu) the Jelly-Fish™ is selected for the "middle" display in the Main Menu. This will be the case even if a source also is selected for the Audio Vector Oscilloscope.

The source for the Audio Vector Oscilloscope is selected from the Output Matrix Column line #53,54 (PHAS).

• Note that the Phase Correlation meter and Audio Vector Oscilloscope are sharing the same destination Column, PHAS, in the Audio Matrix

If it is required to alternate between the Audio Vector Oscilloscope and the Surround Sound Jelly-Fish™ display it is recommended to create two user presets. In this way it is not required to rese-lect the Audio Matrix each time a change is required. Just enter the Preset Menu and Recall the required preset.

Refer to section 8.1 "Navigating the Matrix" for a detailed description on how to navigate the Matrix.

Both the Audio Vector Oscilloscope and Surround Sound Monitor are using dynamic auto adjustment (scaling) on the horizontal and vertical scales. Auto scaling enables the display window to "follow" the average input signal level, resulting in a metering close to full-scale for most of the time.
Because of this dynamic scaling it is important to notice that the Audio Vector Oscilloscope and Surround Sound Monitor can not be used to monitor the actual level of the signal but only the relative value.

This auto-adjustment feature referred to as the Meter Compressor function or just (C-OFF) is a user parameter and can be set on/off. Please refer to section 8.2.2.2 'C-OFF'.

# 16.1 The Audio Vector Oscilloscope (Stereo Image Monitor)

The Audio Vector Oscilloscope is the central display in the MAIN DISPLAY window. It is also known under the names "Stereo Image Monitor" and "Goniometer". It is based on a continuous graphic illustration of the phase and amplitude of the stereo signal in the Lissajous-format.

If phase and amplitude are randomly distributed, the signal is an ideal stereo signal.

Normally this will only happen with a live-recorded signal. Applause from a live-recorded audience gives you an excellent example of a true stereo signal. The figure of a true stereo signal should be represented on the oscilloscope as a perfect circle, or rather a "ball".
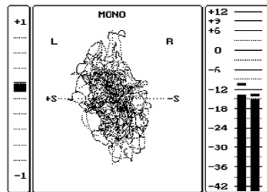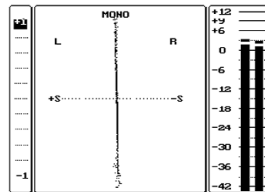


IDEAL STEREO SIGNAL        MONO SIGNAL        REVERSED PHASE STEREO SIGNAL
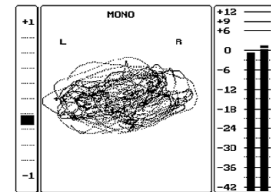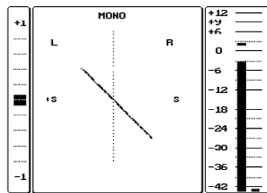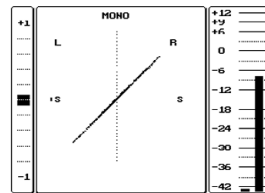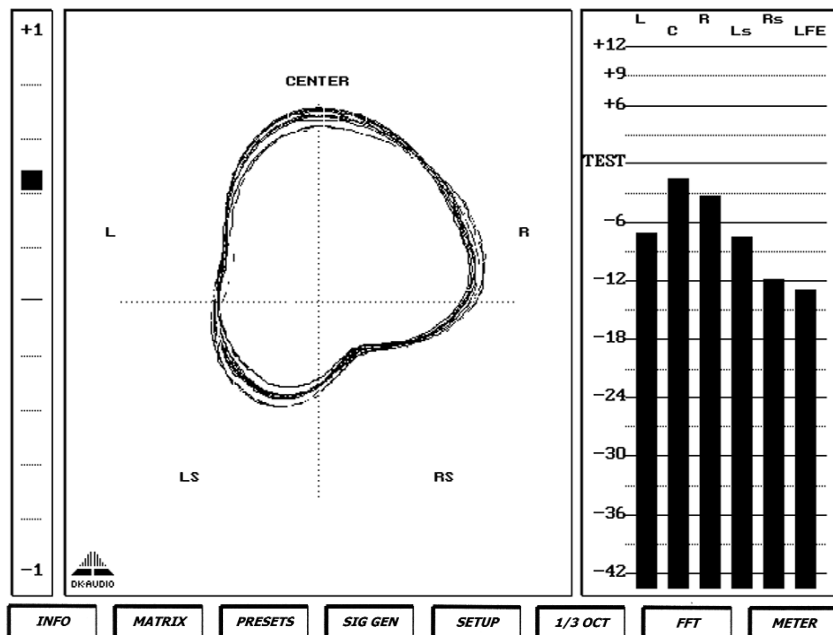
LEFT SIGNAL        RIGHT SIGNAL        REVERSED PHASE MONO SIGNAL
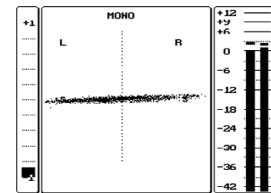
# 16.2 Jelly-Fish™ ((S)) Surround Sound Monitoring

The MSD has a full Surround Sound monitoring function using the unique Jelly-Fish™ image.

The Jelly-Fish™ figure represents the surround channels in a vector format. The Jelly-Fish™ can be used to monitor all standard surround sound formats up to 7.1, including Pro-Logic, 5.1, 6.0, 7.1. In addition a pseudo-surround sound decoding mode of a stereo signal is also provided.

The Jelly-Fish™ monitor was designed to provide a fast and intuitive way of visualising the surround sound field and its complex phase relationships.

Depending on the used format (automatically detected based on the number of sources applied to the surround sound monitor) the MSD will select an appropriate "back-ground" scale for the Jelly-Fish™.

The used labels on the scales do not represent the placement of the speakers in the used surround sound format, but are merely meant to indicate a specific direction in the surround sound field.
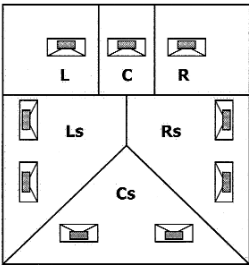
The four Surround Sound formats supported can
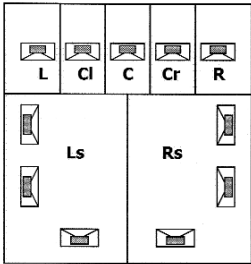also be illustrated as below.
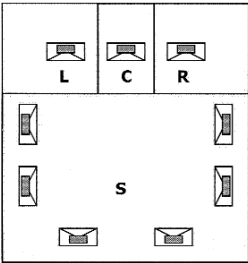


Format Pro-Logic (MSD600M Preset 4)
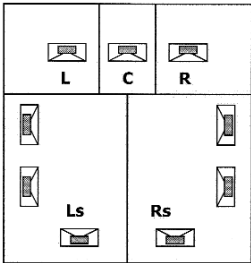


Format 5.1 (MSD600M Preset 5,
MSD600C-5.1 Preset 2)



Format 6.0 (MSD600M Preset 6)



Format 7.1 (MSD600M Preset 7)

To set-up the MSD for a given surround sound for-
mat the specific Matrix outputs (Line #55-62,
CENT, C+1 - C+7) have to be assigned to a source
(input). The number of outputs assigned determines
the surround sound format selected.

| Matrix Surround Sound Source | Jelly-Fish™ Display Label | Corresponding PPM Bargraphs | | Physical Source |
|---|---|---|---|---|
| | | Number | Label | |
| CENT | CENTER | CH 3 | C | Analogue 2 L |
| C + 1 | R | CH 2 | R | Analogue 1 R |
| C + 2 | RS | CH 4 | S | Analogue 2 L |
| C + 3 | LS | CH 4 | S | Analogue 2 L |
| C + 4 | L | CH 1 | L | Analogue 1 L |

*Comparison between the Physical Input source and the labelling used on the Jelly-Fish™ and the PPM Bargraph.*
*Based on MSD600M Preset 5 & MSD600C-5.1 Preset 2.*

As it is the case with all of the surround sound factory presets, it is recommended that the destination channels allocated to the surround sound monitor is assigned via the PPM meters, clockwise following Matrix line #55-62 (CENT, C+1-C+7) allocated to the PPM meter and assigned to the respective physical audio input. In that way the actual physical audio input correspond to a given PPM. This also means that only one cross-point in the matrix have to change if the actual set-up differ from the preset or if a new source for a given physical input has to be selected.

A complete comparison list for all the surround sound formats can be found in the appendix of the Technical Reference Manual.

- When monitoring a surround sound signal it is always recommended to use one of the factory presets (preset #4-9) as a template for MSD settings. In that way a problem free guide on how to "wire up" the MSD can be ensured when following the instructions found in section 9 of this Manual
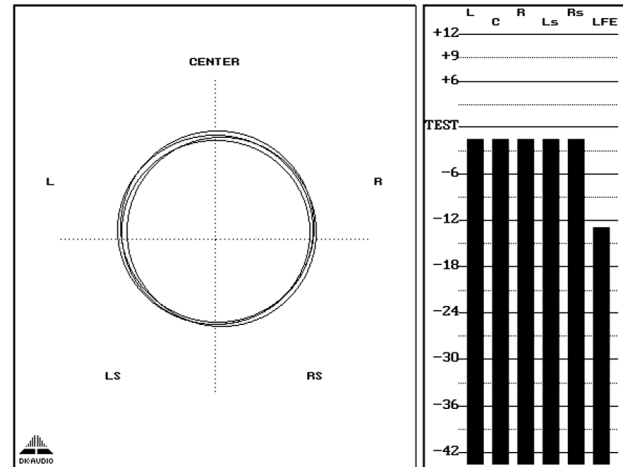
To monitor the complex phase relationships in a common surround sound signal the Jelly-Fish™ is identifying any phase problems accurately by a colour change to red in the relevant vector in the Jelly-Fish™ image. The width of the red colour spot indicates the degree of phase error.

To monitor the exact phase relation between any two signals in the Jelly-Fish™ these signals can be routed to the separate Phase Correlation Meter.

• When using a preset on a surround sound format using a separate Low Frequency Energy "LFE" channel (format 5.1 and 7.1) the MSD will automatically include this LFE channel on the PPM Meter. Since the LFE channel do not contain any frequency information that can be directionally determined it is NOT included in the Jelly-Fish™ monitor

# Registration

Please fill in the registration card that was enclosed with your MSD product and mail or fax it to DK-Audio to obtain the latest information about new products. If your Registration Card is missing, you may use this page instead.

Name: _____

Company: _____

Address: _____

Postcode/City: _____

Country: _____

Phone: _____

Fax: _____

E-mail: _____

Model No: _____

Unit Serial No: _____

Purchase Date: _____

Purchased from (dealer): _____

Which features would you like to see in new versions of this model?

_____

_____

_____

_____

Comments:

_____

_____

_____

MAIL OR FAX TO:
DK-Audio A/S
Marielundvej 37D, DK-2370 Herlev, Denmark

E-mail: info@dk-audio.com
Fax:     + 45 44 85 02 50