[User's Manual]

MSD100
MSD100AES/SA
MSD100T/SA

MASTER STEREO DISPLAY

www.dk-audio.com

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Note: *This manual covers all MSD100 Series models. The main text refers to the MSD100 but applies to all models. Special notes, subsections and tables are provided to describe operational features that are unique to specific models.*

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1. INTRODUCTION

This section provides a description of the MSD100 Series, lists related documentation and notation conventions, and provides product support contact information. The DK-Audio MSD100 Master Stereo Display Series models are universally recognised professional audio metering system for broadcast and studio applications. The MSD100 Series supplements the human ear by providing a visual representation of audio level, phase, stereo imaging and more. The entry-level MSD100 is shown in Figure 1-1.

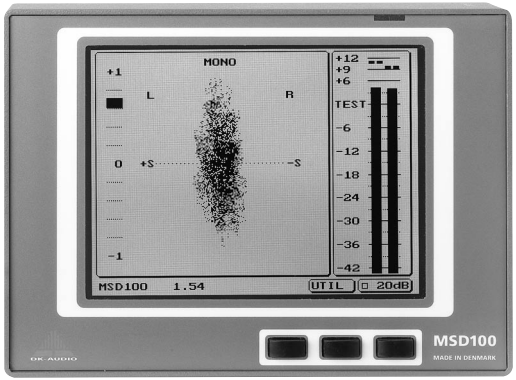

Figure 1-1. MSD100 Master Stereo Display

The MSD Series models covered in this manual are:

- MSD100
- MSD100AES/SA
- MSD100T/SA

Note: *This manual covers all MSD100 Series models listed above. The main text refers to the MSD100 but applies to all models. Special notes are provided to describe operational features that are unique to specific models.*

The MSD100 Series models deliver monitoring capabilities beyond traditional instruments such as bar graphs, LEDs and oscilloscopes.
All MSD100 Series units provide the following basic functions:

- Phase Meter
- Audio Vector Oscilloscope
- Level Meter with selectable PPM/VU scales
- Selectable reference level
- LED overload Indicator
- Peak Hold

The MSD100T/SA adds the following features:
- Spectrum Analyser
- Transformer balanced audio inputs with XLRs

The MSD100AES/SA adds the following features:
- Spectrum Analyser
- Digital Data Readout

1.1 Using this Manual

This manual contains information and instructions necessary to install, configure and operate the MSD100, MSD100AES/SA and MSD100T/SA. It provides step-by-step instructions you must perform to install and operate your MSD100 Series model successfully. This manual contains the following information:

Section 1 **Introduction.** Includes a brief description of the MSD100 Series, lists related documentation, provides product support contact information.

Section 2 **Overview.** Describes the MSD100 functions, hardware components, physical enclosure, and connectors.

Section 3 **Installation.** Provides instructions on how to install the unit and connect audio and power cables.

Section 4 **Set-up and Operation.** Provides instructions on how to operate the MSD and use the main display, control keys, phase correlation meter, audio vector oscilloscope, and peak programme meter. It describes how to interpret displayed data, adjust PPM peak hold meters, input gain, utilities, brightness, and viewing angle.

Section 5 **Digital AES/EBU Versions.** Describes the operation of the bitstream status display on the digital audio MSD100AES/SA model.

Section 6 **Spectrum Analyser Versions.** Describes the operation of the Spectrum Analyser of the MSD100T/SA and MSD100AES/SA models.

Appendix A **Specifications.** Provides the technical and physical specifications for the MSD unit.

Glossary **Glossary.** Provides full spelling of acronyms and abbreviations and the definitions of special industry terms used in this manual.

Product Registration **Registration Card.** This page can be used if the registration card is missing. Either the form or the card can be mailed or faxed to DK-Audio.

1.2 Notation Conventions

Before you begin working with the MSD100, familiarise yourself with the notation conventions used in this manual.

Convention/Symbol	Meaning/Example
	Used together with italic type to point out important information and notes.
Caution	Important cautions and safety-related information, such as "Never apply power while the housing is removed".

Boldface Type	Keys you must press, such as **[LEFT]**, **[UTIL]**, **[CAL]**, **[DEFAULT]** and **[EXIT]** keys.
Italic type	Emphasises operational differences of specific models, such as *This function is not available on the MSD100AES/SA.*

1.3 Related Documentation

The Audio Metering book provides additional information about related technologies, and is available from your local dealer.

- Audio Metering, Eddy Bøgh Brixen, Broadcast Publishing & DK-Audio A/S, Denmark 2001

1.4 If You Need Help

If you need assistance while working with your MSD100 Series product, please contact your local dealer or tech.support at DK-Audio:

Telephone	+45 44 85 02 55
Fax	+45 44 85 02 50
Mail registration	DK-Audio A/S, Marielundvej 37D DK-2730 Herlev – Denmark
E-mail	info@dk-audio.com
Web address	www.dk-audio.com

You can access the following Technical Support information from our web site:

- Product Specifications
- Software downloads (Not available for MSD100-series)
- User's Manuals
- FAQ (Frequently Asked Questions)
- Direct contacts

2. Overview

This section provides an overview of MSD100 audio metering functions, applications, a physical description and a summary comparison table.

2.1 Audio Metering

The DK-Audio MSD100 Master Stereo Display Series provides producers, sound engineers and technicians with an objective visual representation of audio characteristics. By supplementing the human ear with meters and scopes based on international standard measurement scales, the risk of over-reliance on subjective criteria is minimised. All models in the Master Stereo Display Series ranging from the simple monochrome version to the multi-channel colour version provide the following basic functions:

FUNCTION	**DISPLAY**
Phase meter	Average phase relationship between two audio signals
Level meter	Level of signal with peak and overload protection with several selectable international scales and reference levels
Audio vector oscilloscope	Picture of audio signal indicating mono or stereo patterns

2.2 MSD100 Applications

The small physical size and versatility of the Master Stereo Display makes it ideally suited for:

- Master metering of any mixing console
- Studio and broadcast facilities
- OB-Vans
- Hard disc recording and editing systems
- Home studios

The MSD100 Series provides serious audio professionals with these essential features backed by a 2-year warranty:

- Phasemeter
- Audio vector oscilloscope
- Level meter with 6 selectable PPM/VU scales
- Individually selectable input reference levels with an additional 20dB of input gain (100, 100T/SA)
- LED overload indicator

- Peak hold
- Simultaneous display of stereo information and audio levels
- Softkey selectable PPM characteristics
- Support for most international standards
- Digital processing, eliminating scale errors
- Storage of all user defined parameters in NV-RAM
- Long life CCT backlight (15.000 hours)
- Digital Data Readout (100AES/SA)
- FFT and 1/3 octave spectrum analyser (100T/SA and 100AES/SA)

2.3 Physical Overview

Each MSD100 model is housed in a cabinet measuring 179 mm wide x 129 mm high (without bracket) x 39 mm deep. The display area is 120 x 92 mm.

2.4 Audio Inputs

The rear-panel audio connection and signal types vary by model as described in Table 2-1.

Model	Connector Type	Signal type
MSD100	RCA phono plugs	Unbalanced stereo
MSD100AES/SA	Female XLR sockets	Balanced AES/EBU (digital)
MSD100T/SA	Female XLR sockets	Balanced

TABLE 2-1. MSD100 SERIES REAR PANEL CONNECTIONS

2.5 Power Supply

The 2.1 mm power input connector on the rear of the MSD100 cabinet accepts 12-30V DC.
The power supply is based on both switch-mode and linear regulation principles and accepts both AC and DC inputs.

Recommended supply voltages are:

- 12 to 30V DC
- 12 to 20V AC, 50Hz

An optional 230V power supply, such as the Model MSD100-PS/0, is available with the following typical specifications:

Input: 100-240V AC, 47-63 Hz, 1.0A
Output: 15V DC, 1.0A, 15W max.

Caution

Caution: *High voltage for the LCD background light is generated internally. Use special care when servicing as 600V AC is present on the circuit board.*

2.6 Model Comparison Summary

Table 2-2 provides a comparison of MSD100 models.

TABLE 2-2. MSD100 COMPARISON SUMMARY

	MSD100	MSD100T/ SA	MSD100AE/ SA
DISPLAY			
Display Type	LCD	LCD	LCD
Colour/Mono	Mono	Mono	Mono
Display view area (mm)	120x92	120x92	120x92
INTERFACE			
Analogue stereo inputs	1 (Un-balanced)	1 (Transformer Balanced)	-
Analogue stereo outputs	-	-	-
Digital AES/EBU inputs	-	-	1
Digital AES/EBU outputs	-	-	Link (loop through of dig. input
LED overload	+	+	+
Audio connectors	Phono	XLR	XLR
ANALYSER			
Phasemeter	+	+	+
Audio vector oscilloscope	+	+	+
PPM/VU Level meter scales	6	6	6
FFT Spectrum Analyser 1/3 octave spectrum	- -	+ +	+ +
analyser			
MISCELLANEOUS			
Supply voltage range	12-20 V AC / 12-30 V DC		
Dimensions (mm) HxWxD	129x179x39		

3. Installation

This section describes how to mount the MSD100 and connect audio and power.

3.1 Mounting

All MSD100 models are supplied with the following accessories for easy mounting on any console or desk:

- Circular base plate
- Bracket (U-form)
- 3 finger screws with washers

The bracket facilitates horizontal and vertical adjustment for optimum viewing.

3.1.1 MOUNTING FOR HORIZONTAL AND VERTICAL ADJUSTMENT

To mount the MSD100 for greatest viewing flexibility:

1 Attach the base plate to your console or work surface using two 4mm wood screws (or alternative).
2 Secure the bracket to the base plate with the supplied finger screw.
3 Insert a star washer between the base plate and the bracket.
4 Attach the MSD100 to the bracket using the two finger screws.
5 Insert star washers between the MSD100 and the bracket to ensure a firm grip.

3.1.2 MOUNTING FOR HORIZONTAL ADJUSTMENT ONLY

To mount the MSD100 more firmly, allowing horizontal adjustment only:

1 Secure the bracket directly to the console or work surface using two 4 mm screws (not supplied).
2 Attach the MSD100 to the bracket using the two finger screws.
3 Insert star washers between the MSD100 and the bracket to ensure a firm grip.

3.2 Audio Connections

For all MSD100 models, please observe the following precautions:

- Use standard audio signal cable or similar
- Ensure that all connections are firmly secured
- Allow sufficient loose cable for the unit to be tilted and turned

Rear-cabinet connector types vary by model, as shown in Table 3-1.

TABLE 3-1. MSD100 SERIES AUDIO CONNECTIONS

Model	Socket Type	Pinouts	Input Signal
MSD100	RCA-phono sockets	Shield – ground Pin – signal Marked [L] Left and [R] Right	Analogue Unbalanced stereo
MSD100AES/SA	Female XLR sockets ***Note:*** *A male XLR socket is available for routing signals to other equipment.*	Pin 1 = Ground Pin 2 = Signal Pin 3 = Signal (IEC269-12 compliant) ***Note:*** *Observe that signals on pins 2 and 3 are "in phase" in the digital mode.*	Digital Balanced AES/EBU or SP/DIF
MSD100T/SA	Female XLR sockets Inputs are transformer balanced	Pin 1 = Ground Pin 2 = In Phase Pin 3 = Out of Phase (IEC268-12 compliant)	Analogue Balanced

3.3. Power Connection

Each MSD100 Master Stereo has a 2.1 mm DC-power socket on the rear of the unit.
Power can be fed from a standard power adapter or from an appropriate power source in your console or desk.
Table 3-2 lists the AC and DC operating range and operating recommended supply voltages.

TABLE 3-2. MSD100 SUPPLY VOLTAGE SPECIFICATIONS

Operating range	12 to 20V AC, 50 Hz	12 to 30V DC
Recommended supply voltage	12V AC, 50 Hz	12V DC

A standard 100-240V AC, 47-63 Hz, 1-0 A power adapter can be supplied as an option. Order no. MSD100-PS/0

4. Operation

This section provides operational information for MSD100 common functions available on all MSD100 models:

- Main display
- Phase meter
- Audio vector oscilloscope
- Peak programme meter and supported PPM scales

It also describes operation of unique functions available only on specific MSD100 models:

- Bitstream status display
- Spectrum analyser

4.1 Main Display and Control Keys

The MSD100 Main Display, shown in Figure 4-1, shows the following information simultaneously:

Phase Meter	Left
Audio Vector Oscilloscope	Centre
Level Meter	Right
Menu text line for soft keys	Bottom

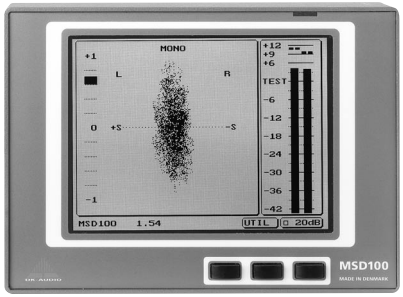

Figure 4-1. MSD100 Main Display

4.1.1 INITIAL DISPLAY AT POWER UP

After power up, the LCD panel initially displays the software version installed, for example MSD100 1.54.

4.1.2 FUNCTION KEYS

The three black keys operate the functions displayed in the menu text line directly above them. For example, the left function key toggles between SPECT and EXIT.
An empty black box displayed next to a function in the menu text line, such as shown below, indicates that this function is disabled or OFF.

☐20dB

Clicking the function key directly below 20dB toggles between ON (black box) and OFF (empty box) status. This operation applies to other functions such as Left, Right, Hold and Fast.
The function keys are also used to increase and decrease values as shown below.

↑|99|↓

4.1.3 ADDITIONAL INFORMATION DISPLAYED ON DIGITAL MODELS

In addition to the phase meter, audio vector oscilloscope, level meter and menu text line, the digital MSD100AES/SA models also show the sampling frequency. Figure 4-2 shows the frequency of **48000**.

Note:** If no signal is present, this numeric field will indicate **[OPEN].

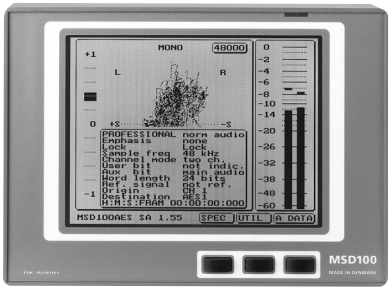

Figure 4-2. MSD100AES/SA with Sampling Frequency

4.2 Phase Correlation Meter

The Phase Correlation Meter displays the average phase relationship between two audio signals, and indicates mono, stereo or reverse-phase on a centre-zero scale.

TABLE 4-1. IDEAL STEREO AND MONO SIGNALS

Signal	Ideal	Display/Comment
Stereo	[0]	Perfect circle or ball. See Figure 4-3. This representing a random distributed phase with maximum ambient effect.
Mono	[+1]	Vertical straight line. See Figure 4-3. A [0] to [-1] indicates signal with reversed phase components approaching a horizontal line displayed in Fig. 4-3. ***Note:*** *Never allow a negative reading if the signal is to be reproduced in mono.*

Table 4-1 and Figure 4-3 describe optimum stereo and mono signals measurements and corresponding displays.

Note: *Input signals below a predefined threshold will force the indication toward zero. Only major phase components are considered.*

4.3 Audio Vector Oscilloscope

The audio vector oscilloscope, also know as a stereo image monitor or goniometer, provides continuous Lissajous-format display of the phase and amplitude of the stereo signal.
An ideal stereo signal has phase and amplitude components randomly distributed.
The best example of a true stereo signal is from an audience applauding during a live recording. This is represented graphically on the oscilloscope as a perfect circle or ball, as shown in Figure 4-3.
See the examples of phase meter and oscilloscope displays under different signal conditions in Figure 4-3.

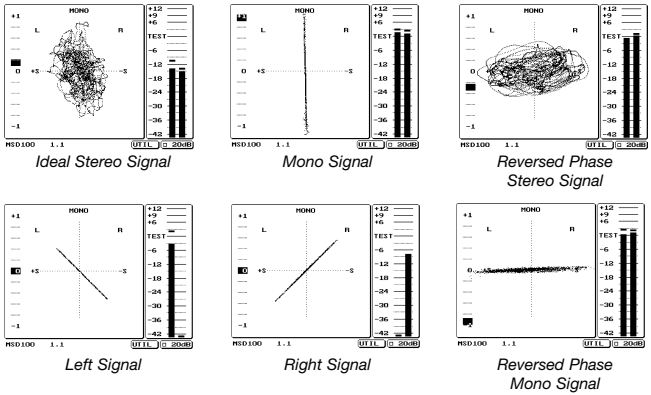

Figure 4-3. MSD100 Displays for Signal Conditions

4.4 Peak programme Meter

The peak programme meter (PPM) directly measures the quasi-peak levels of complex electrical signals, such as music and speech.

The PPM accomplishes this by:

- Maintaining constant sensitivity of the device, optimising use of the transmission channel and recording medium.
- Using a full-wave rectifier with integration time set for highest amplitude without overloading the transmission link and for sufficient duration to avoid audible distortion.
- Long return time to minimise viewer fatigue.

4.4.1 INTERNATIONAL PPM SCALES SUPPORTED

The MSD100 supports four different international PPM scales in accordance with IEC 268-10, IEC 268-17, and DIN 45406. This instrument also complies with standard VU and two digital scales.
Table 4-2 lists the scales for all units

TABLE 4-2. AVAILABLE SCALES

Type I	Nordic
Type IIA	BBC
Type IIB	EBU
Type DIN	
Type VU	
Type DMU1	Digital
Type DMU2	Digital

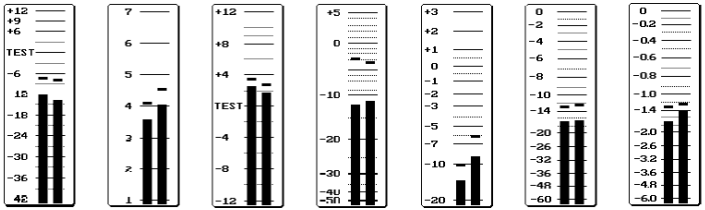

Figure 4-4. Available PPM Scales

Use the **[UTIL]** menu to select the different scales shown in Figure 4-4.

4.5 Level Meters

The MSD100 Level Meter provides these additional functions:

- "Flying" Peak indicators
- Peak Hold
- LED-overload indicators
- Individual reference level selection

4.6 Adjusting Input Gain [20dB]

You can increase the input sensitivity to obtain the best possible dynamic range and accuracy for a weak signal. To increase the input sensitivity by 20dB:
Press the function button for ☐ 20dB. The checkbox turns black.

Note: *The input gain function is not available on the digital MSD100AES/SA model.*

4.7 Using the Utilities Menu

You can use the Utilities [UTIL] menu to:

- Adjust display brightness
- Adjust contrast for viewing angle
- Select PPM scales
- Select inverted display

Note: *The high-quality LCD display reacts quickly to light and angle adjustments, but may still require that you allow several seconds for the display to stabilize between adjustments.*

4.7.1 ADJUSTING BRIGHTNESS

To adjust the brightness of the display:

1 Press **[UTIL]**.

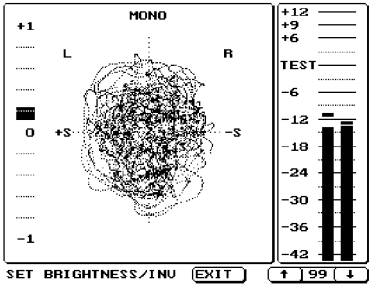

Figure 4-5. Set Brightness/Inv Menu

2 Press **[LIGHT]**. The Set Brightness menu is displayed as shown in Figure 4-4.

3 Press function keys for ↑ and ↓ to increase or decrease brightness. This adjusts the background lighting for the best viewing clarity.

4 When finished, press **[EXIT]** to return to the Main Menu.

4.7.2 ADJUSTING VIEWING ANGLE (CONTRAST)

To adjust the contrast of the display:

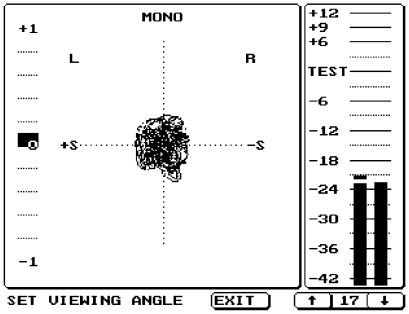

Figure 4-6. Set Viewing Angle Menu

1 Press **[UTIL]**.

2 Press **[ANGLE]**. The Set Viewing Angle menu is displayed as shown in Figure 4-5.

3 Press function keys for ↑ and ↓ to increase or decrease contrast. This adjusts the angle (contrast) for the best possible viewing angle.

4 When finished, press **[EXIT]** to return to the Main Menu.

4.7.3 SELECTING INVERTED DISPLAY

To reverse the colours so that the screen will appear black with white text and figures:

1 Press **[UTIL]**.
2 Press **[LIGHT]**. The Set Brightness/ Inv Menu is displayed as shown earlier in Figure 4-4.
3 Press function key for ↑ to increase to **[99]**. The display becomes inverted.
To toggle between inverted and normal display, press the ↑ key again.
4 When finished, press **[EXIT]** to return to the Main Menu.

4.8 Selecting PPM Options

The Peak Programme Meter Menu indicates the level of the audio signal for each channel. The PPM includes Flying Peak, Peak Hold, Fast Peak and 20 dB gain options and includes seven international scales.

4.8.1 SELECTING PREFERRED PPM SCALE

You can select from up to seven international scales, described earlier in Table 4-2.
To obtain the complete set of specifications, refer to the following recommendations:

- IEC 268-10 Peak Programme Level Meters
- DIN 45406
- Pflichtenhefte 3/6
- IEC 68-17 VU Meter
- Nordic N9
- CCIT Report 292-2
- CCIT BS6840 part 10

See Figure 4-4 for available PPM scales.
To select the preferred PPM scale:

1 Press **[UTIL]**.
2 Press **[PPM]**.
3 Press **[SCALE]**. The Scale Menu is displayed with three options: **[PREV]**, **[NEXT]** and **[SELECT]**.
4 Press **[NEXT]** or **[PREV]** as needed to move forward or backward through the scale types displayed in the menu text line: I, IIA, IIB, DIN, VU, DMU1 and DMU2.

***Note:** The last choice, **REF**, is for setting the reference (test) level for that scale.*

5 When the preferred scale is displayed, press **[SELECT]**. The selected scale is displayed.
6 Press **[EXIT]** to return to the Main Menu.

4.8.2 SETTING THE PPM REFERENCE LEVEL

After you select the preferred PPM scale, you can set the reference (test) level for that scale.

To set the PPM reference level:
1 Perform Steps 1 through 5 under Selecting Preferred PPM scale.
2 After you press **[SELECT]**, press the function keys for ↑ and ↓ to set the reference level.
3 After you set the level, press **[EXIT]** to return to the Main Menu.

4.8.3 USING THE LED OVERLOAD INDICATORS

When an overload condition occurs, the following indicators activate simultaneously:

- Two red LED overload indicators in the front plate illuminate. The LED indicators, located directly above the PPM bars, light up when the selected reference level for the scale is reached (for example at +6dB for Type I, Nordic scale).
- Split bars appear in the PPM bars in the LCD display.

4.8.4 USING THE PPM PEAK HOLD FUNCTION

The Peak HOLD function enables you to check the maximum signal level reached during and after a recording session. This helps you confirm that levels did not exceed specified limits.
In the HOLD mode, the "flying" segments of the PPM bars indicate the highest bar-graph values attained since

the last HOLD reset. HOLD reset is activated by re-selecting any function scale.

To select Peak HOLD:

1 Press **[UTIL]**.
2 Press **[PPM]**.
3 Press **[OPTION]**. The menu text line displays TOGGLE PPM OPTION.
4 Press **[HOLD]** to toggle the Peak HOLD function ON or OFF. When ON, the checkbox next to HOLD is black.
5 When finished, press **[EXIT]** to return to the Main Menu.

4.8.5 USING THE PPM FAST MODE

You can use the FAST mode to set the PPM integration time to zero, making the bar graphs indicate peak values of the input signal.

Note: *When using a steady sinusoidal signal input, the bar graphs respond the same with or without FAST mode.*

To select the FAST Mode:

1 Press **[UTIL]**.
2 Press **[PPM]**.
3 Press **[OPTION]**. The menu text line displays TOGGLE PPM OPTION.
4 Press **[FAST]** to toggle the FAST function ON or OFF. When ON, the checkbox next to FAST is black.
5 When finished, press **[EXIT]** to return to the Main Menu.

4.9 Changing Default Settings

You can change the factory set default settings for brightness, viewing angle (contrast) and preferred scale.

To change the default settings:

1 Power off the unit.
2 Press and hold **[UTIL]** key (middle key) while powering up the unit. The Set Up Utility menu is displayed with **[CAL]** and **[DEFAULT]** options as shown in Figure 4-6.

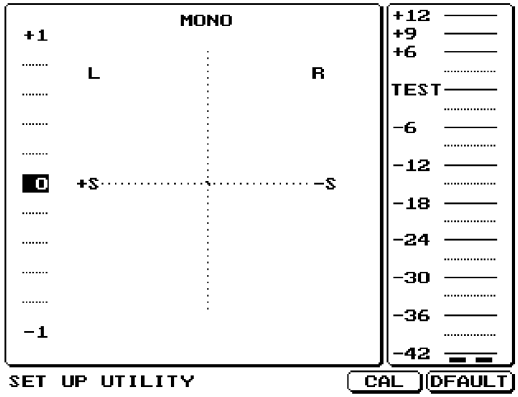

Figure 4-7. Set Up Utility Menu

3 Press **[DEFAULT]** and follow procedures in this section for adjusting settings for brightness, viewing angle (contrast) or preferred scale.

4 Turn off the power again. The new settings will be stored in memory as the new defaults for the next power up.

4.10 Bitstream Status Display

The Bitstream Status Display is used for viewing status information for each AES/EBU channel, provided that this information is available in the signal. This display is included in MSD100AES/SA.

4.10.1 AES/EBU DECODING MODE

Table 4-3 lists the Bitstream Status Display information for the AES/EBU (Professional) decoding mode:

TABLE 4-2. DATA INFORMATION FOR AES/EBU MODE

Professional/ Consumer (Signal originates from Professional or Consumer eqpt)	Professional (AES/EBU) or Consumer protocol – IEC958 (S/PDIF)
Emphasis	None - No emphasis indicated No emphasis, manual selection not possible Emphasis 50/15 µs Emphasis ITU J.17
Lock	Sampling rate lock not indicated Sampling rate of source not locked
Sample Frequency	Not indicated Sampling rate = 48 kHz Sampling rate = 44.1 kHz Sampling rate = 32 kHz
Channel Mode (Information on relationship between audio signals in the two channels)	Not indicated Two channel One channel (mono) Primary/secondary mode (chan 1 is primary) Stereo, channel 1 is left channel Reserved for user-defined data One chan double sampling frequency One chan stereo: left-double sampling freq. One chan-stereo: right double sampling freq. Multi-channel, vector for byte 3
User Bit (user-defined bit)	Not indicated
Word Length	24-bits Other lengths
Reference Signal	Not referenced
Origin	Signal source, for example DAT 1
Destination	Signal destination, for example AES 1
H:M:S:Frame	Time code (Hours:Minutes:Seconds and Frame Count) Blank = No time code

4.10.2 CONSUMER DECODING MODE

The Bitstream Status display can also be used for decoding information from consumer-grade sources, using the protocol for Sony Philips Digital Interface S/PDIF) or IEC958. Although the structure of the stream is similar to AES/EBU, there are a number of important differences:

- Audio or data state
- Copyright or non-copyright protection
- No emphasis or 50/15 µs emphasis
- 2 or 4-channel audio
- Device
    - o Laser/optical
    - o Signal processor
    - o Magnetic tape or disk
    - o Digital audio broadcast
    - o Music instrument, microphone or other digital source

4.10.3 DISPLAYING CHANNEL INFORMATION

To display the Channel A information, press **[A DATA]**.
To display the Channel B information, press the same key again.

To return to the main menu, press the same key again.

4.11 Spectrum Analysers

The FFT and 1/3 Octave Spectrum Analysers, used for determining frequency content of a signal, are included in the following MSD100 models:
- MSD100T/SA
- MSD100AES/SA

The FFT-analyser is used as an accurate measuring tool, the 1/3-octave analyser shows the energy distribution of the signal.

4.11.1 FFT Spectrum Analyser

The FFT Analyser uses a complex Fast Fourier Transform (FFT) algorithm that outperforms earlier analogue counterparts in the number of frequency bands and indication range.
This analyser uses a 1024-band FFT algorithm to display the signal content between 44Hz and 20kHz, covering the dynamic range from –70 to +10dBu. These improvements make it possible to analyse frequency response, noise, and intermodulation (IM) distortion with much greater accuracy.

Figure 4-6 shows the FFT Spectrum Analyser display on the MSD100/SA.

To select the FFT Spectrum Analyser mode:

1 Press **[FFT]**. The FFT screen is displayed, as shown in Figure 4-6.
Frequency indicators from 44 Hz to 20.000 Hz appear at the bottom of the screen. Level indicators, in 10dB increments from –70 to +10dBu appear on the left side.

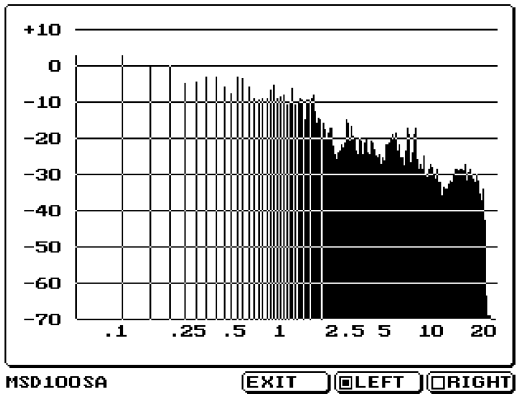

FIGURE 4-8. FFT Spectrum Analyser

2 Press **[LEFT]** or **[RIGHT]** to select the left or right input signal for FFT analysis. A small black square indicates the input selected. It toggles on or off as the key is pressed.

***Note:** To analyse a mono signal, press both **[LEFT]** and **[RIGHT]** keys.*

3 To return to the main menu, press **[EXIT]**.

4.11.2 1/3-OCTAVE SPECTRUM ANALYSER

The 1/3-octave spectrum analyser provides real-time frequency analysis through a bank of filters, each with a relative bandwidth of 1/3 octave. This instrument provides a 31-bar display for numerical and graphical visualisation of the signal energy present at different frequencies across the audio range from 20Hz to 16kHz.
The 1/3-octave spectrum analyser has many applications, including acoustical measurements in control rooms and PA system. The relative bandwidth filters are ideally suited for applications where the signal being measured must also be heard, since the ear perceives frequencies logarithmically.

Appendix A

Specifications

This appendix lists the performance specifications for the MSD100 Series.

A.1 Power Supply

Supply voltage range	DC input: 12V to 30V AC input: 12V to 20V
DC current consumption @12V nominal supply	<600 mA
Power dissipation	6.5W, approximately
Safety standard	IEC 65

An optional 230V/50Hz AC power supply adapter is available.

A.2 Cabinet Dimensions

Width	179 mm
Height w/out bracket	129 mm
Depth	39 mm

A.3 Level Meter

Reference indication	0 dBm	
Reference input voltage	1.55V	
Reference input voltage adjustment	+13 dB to –2 dB	
Division of scale:	Type I	-42 dB to +12 dB
	Type IIA	1 to 7
	Type IIB	-12 dB to +12 dB
	Type DIN	- 50dB to +5 dB
	Type VU	-20 dB to +3 dB
	DMU1	-48 dB to +3 dB
	DMU2	-60 dB to 0 dB
Amplitude frequency response, 3Hz–20 kHz	± 0.3 dB	
Dynamic response		
a) Pflichtenheft 3/6:	3 ms / -3dB	
b) IEC 268-10	5 ms / -2 dB	
c) IEC 268-17	VU: 300 ms	
Overswing:	None	
Return time		
a) Pflichtenheft 3/6	20 dB / 1.5 s	
b) IEC 268-10	20dB / 20 s	

Reversibility error	None
Input impedance, analogue	>20 K ohm
Input impedance, AES	1 K ohm
Distortion introduced by the PPM:	None
Temperature range	0˚C to 45˚C
Overload characteristics	>21 dBu
Maximum input level	90V RMS constant

A.4 Phase Correlation Meter

Indication range	1 to +1

A.5 Audio Vector Oscilloscope

Automatic gain adjusting range	30 dB, default
Phase error between channels	None
Display area	69 mm x 69 mm

A.6 LCD Display

Resolution	320 x 240 pixels
Pixel size	0.36 mm
Contrast ratio	Type 8
Viewing area	120 x 92 mm
Viewing angle	90 CR>3
Backlight	White, CCFT
CCFT, Lifetime, continuous driving, 50% intensity	Typical 15.000 hours
LCD surface brightness	Typical; 45 cd / m^2
Backlight adjustment range	65%

Glossary

This glossary defines terms, acronyms and abbreviations used in this manual.

A

Ampere; A unit of current measurement.

AC

Alternating current.

ADC

Analogue-to-Digital converter. A circuit that converts a digital signal to an analogue signal. Also expressed as A/D.

AES

Audio Engineering Society.

AES/EBU

The most widely used serial interface for audio stan dardised jointly by the Audio Engineering Society and European Broadcast Union.

Audio Vector Oscilloscope

Instrument that provides continuous graphic display in Lissajous format of the phase and amplitude of a stereo signal. Also known as stereo image monitor or goniometer.

Bandwidth

The distance between the 3 dB cut-off frequencies on a response curve. Expressed in octaves or Hz.

dB

Measure of audio level. Decibel; logarithmic level specification.

dBu

Measure of audio level. Logarithmic relation with a reference of 0.775 V.

DC

Direct current.

EBU

European Broadcast Union. Association of European radio broadcasting stations.

Emphasis

The requisite frequency correction upon recording and playback in order to obtain a proper frequency response.

Fast Fourier Transform (FFT)

A spectrum analyser using this complex FFT algorithm outperforms earlier analogue counterparts in the number of frequency bands and indication range.

Goniometer

See audio vector oscilloscope.

Hz

Hertz; A frequency measurement in cycles per second.

Inverted Display

The reversal of LCD display colours so that the screen appears black with white text and figures.

LED

Light-Emitting Diode.

Peak HOLD

Circuit which for a shorter or longer period of time is in a position to maintain a peak value display.

Peak Programme Meter (PPM)

An instrument that provides direct measurement of the peak values of complex electrical signals.

Phase

The difference values which alternating current or alternating voltage runs through during a period.

Phase Correlation Meter

Instrument that displays the phase relationship between two input signals, such as left and right channels of a stereo program.

Phono

Consumer-type connector type using a centre conductor and outer shielding.

PPM
See Peak Programme Meter.

RMS
Root Mean Square; the effective value of a signal.

S/PDIF
Sony Philips Digital Interface defined as the consumer format.

Spectrum Analyser
An instrument used for determining frequency content (energy distribution) of a signal.

Stereo Image Monitor
See audio vector oscilloscope.

V
Volt; Unit of measure of electrical potential (voltage).

VU
Volume Unit. Measurement in dB for modulation with a reference of 1.23 V.

Watt
Measurement unit for power.

XLR
Professional audio connector plug type.

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: _____

City: _____

Country: _____

Phone: _____

Fax: _____

E-mail: _____

Unit Serial No: _____

Purchase Date: _____

Purchased from (dealer): _____

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

_____

_____

_____

_____

Comments:

_____

_____

_____

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