

Model LDM-1000

Manual 1770 LOUDNESS METER



dorough

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INTRODUCTION

The purpose of this device is to assist the operator, primarily in the areas of live origination or post production, with a tool to measure the loudness content of Program audio.

Visual monitoring of the audio signal has traditionally been displayed through the use of standard VU or PPM meters.

In 1980, Dorrrough Electronics introduced a LED readout which offered a display of both Peak excursions and average Persistence of the composite waveform on a single scale. Adjusting average program levels so as to meet, but not exceed, their respective references, provided consistent listening levels. Thus this device was termed "Loudness Monitor".

Thousands of these meters are presently in service today as they guide operators to consistent operating levels. One is included in the Loudness Deviation Monitor LDM-1000.

Both the ITU and EBU have developed measurement standards and procedures in the pursuit of loudness values. Their work is described in the ITU-R BS.1770 and EBU-R 128 recommendations. The presentation of this recommendation is offered as a Deviation from Reference Meter and is placed on the front panel to the right of the Dorrrough 10-C Meter.

Two digital displays are located above the Control Panel. One is to set the DialNorm or Target Reference. The other is to display the actual running average Program Loudness as it accumulates over the length of the Start to Stop segment.

GENERAL DESCRIPTION

The front panel of the LDM-1000 includes two analog and two digital displays. The display on the left is a Dorrugh 10-C which displays the average persistence and the true peak of a summed composite waveform.

The second LED display is a Deviation from Reference Meter. In three second intervals, this meter displays the difference in loudness level from the Target Reference.

Two Digital Readouts: One for setting the desired Target Value with the second displaying the accumulated Program Loudness over the period of the segment.

Below the readout is a Control Panel with a bank of eight switches: The first three are Start, Stop, and Reset. The fourth switch enables the Peak Hold for determining the highest Peak in the segment. The following two select Format, either 5.1 or Stereo. The last two are used to set the Target Value in the digital readout.



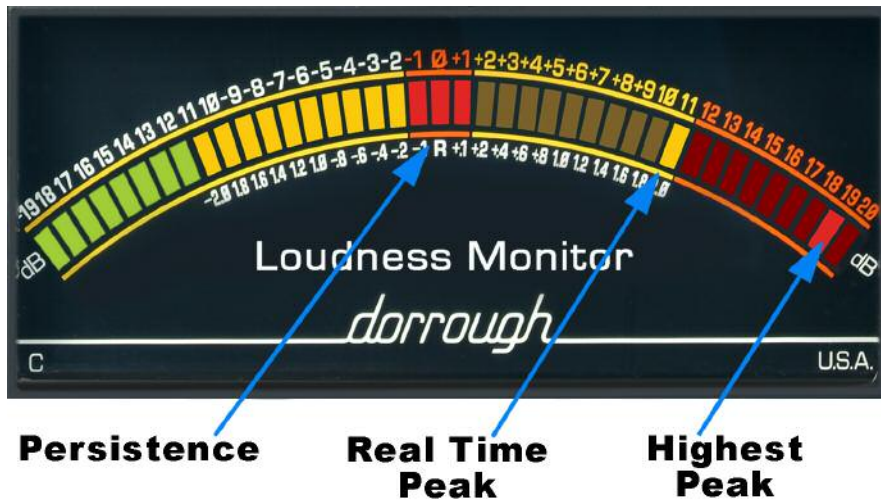
Figure 1 LDM-1000

FRONT PANEL

Dorrough 10-C Loudness Meter

The standard Dorrough 10-C meter displays the vector sum of program in either the surround or stereo formats. Reference point is 20dB from full scale. The reference point can be changed to 18dB from full scale for EBU. The Persistence and the Peak are simultaneously displayed. The True Highest Peak of the program segment is displayed by activating the Peak Hold Control Switch. A permanently lit single LED will appear displaying the highest Peak while the active real time Peak is displayed under this value.

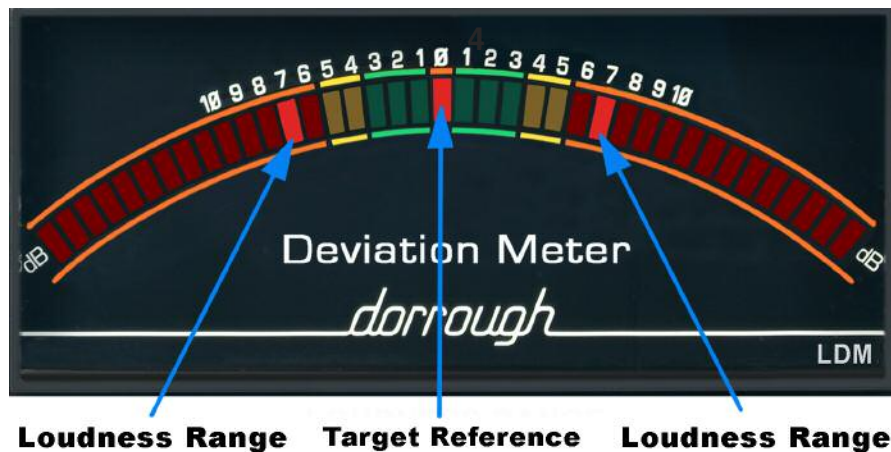
Figure 2 10-C



Dorrough LDM Meter

The center of this meter is a single lit LED at the center point which is referenced to the Target Value selected via the UP and Down switches on the Control Panel. This meter displays a running deviation from the desired set value in 1 LU units per LED updated in 3 second intervals. The maximum deviation from the desired DialNorm reference during a timed segment is displayed as single permanently lit LEDs at its upper extreme and lower extreme. The number of LU units between these two extreme markers indicates the Loudness Range of the timed segment.

Figure 3
Deviation Meter



DIGITAL READOUTS

The Digital Readout on the right displays the desired loudness value or the Target Value set by the operator from the control panel below.

The second Digital Readout displays the accumulated average loudness value as the program progresses through the timed segment. The final number is the average Program Loudness for the segment. This number is compared to the desired number set in the second readout. The difference between these two values should be +/-1.0 LU. If not, the gain on this program material needs to be adjusted to match the Target.



Figure 4
Digital Readouts

CONTROL PANEL

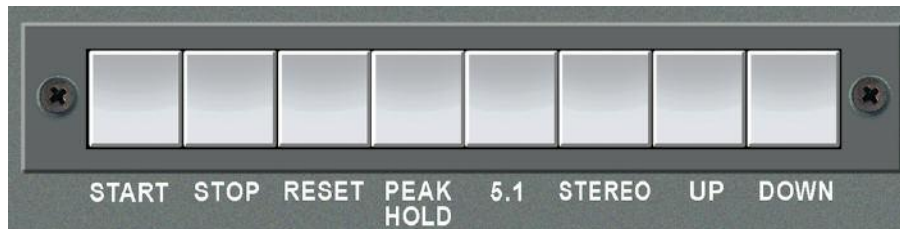


Figure 5
Control Panel

From left to right the Control Panel Switches function as follows:

START / This control starts the Program Loudness long term average computations.

STOP / This control interrupts, stops, or pauses the segment. All accumulated calculations are held in memory until the reset control is activated.

RESET / The Reset control resets program loudness computation for a new timed segment.

PEAK HOLD / The Peak Hold control provides for the display and hold of the highest peak in the program. Reset is accomplished by releasing the function.

5.1 / Activation of this control allows the device to monitor 5.1 or surround inputs.

STEREO / Activation of this control allows the device to monitor the stereo inputs.

Up / Down / The desired Target Value is selected by activation of the UP or DOWN controls until the desired value appears in the display.

INSTALLATION

Connect the IEC power cord to its mating connector on the rear panel.

Connect the Six Surround inputs to the Surround Cluster, with each input cable connecting to its corresponding analog XLR input.

Connect the Two Stereo inputs to the Stereo Cluster, with each input cable connecting to its corresponding analog XLR input.

The DB-25 connector provides an analog output for connection to Dorrough Surround panels for display of the individual channels. Pinouts are per the TASCAM Technical Documentation "DB-25 Pinouts".

OPERATION

SETTING PROGRAM LOUDNESS

Set the desired DialNorm or Target Number via the Control Panel with the UP and Down push buttons.

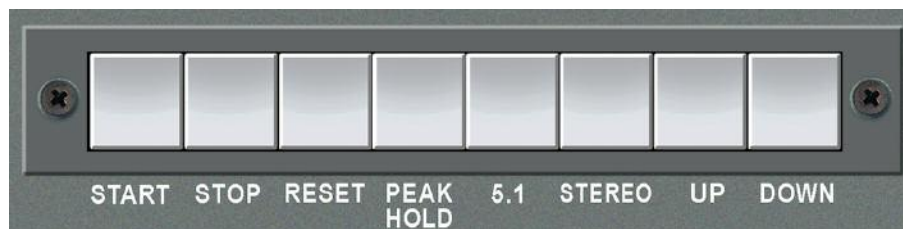
The Target Loudness Number will appear in the right digital readout. The Peak Hold button should be activated at this time.

Select the program format with the 5.1 or Stereo button. The timed program sequence begins by pushing the Start button. When the segment begins, the second digital readout begins displaying the Accumulated Loudness number.

Figure 6
Digital Readouts



Figure 7
Control Panel

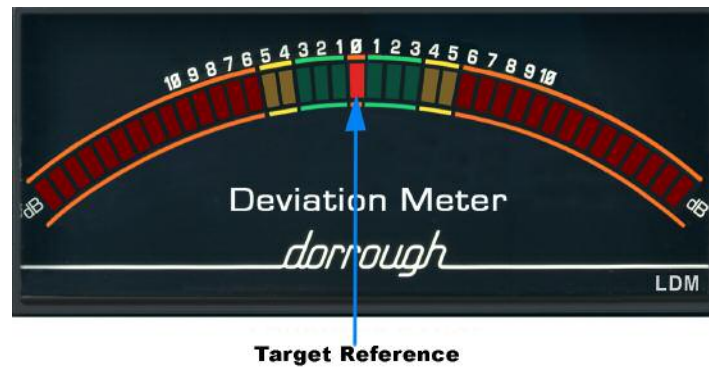


OPERATION

READING THE DEVIATION METER

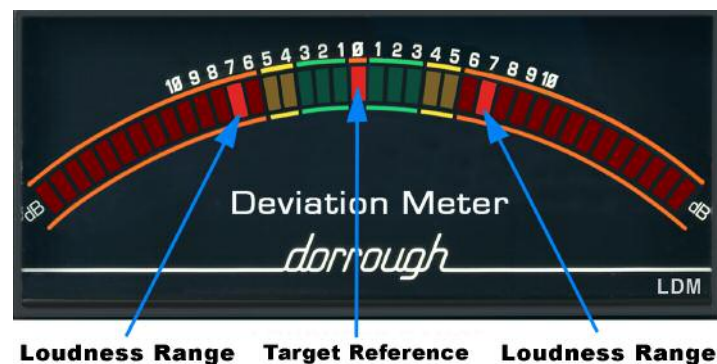
The Deviation Meter is referenced to the Target Value and displayed as a single lit LED at Center Point. This single LED moves up or down scale displaying the deviation from the set reference in 1dB Loudness Units and is updated in 3 second intervals.

Figure 8
Deviation Meter



The actual Loudness Range is calculated and displayed as the maximum deviation above and below reference during the program sequence and is displayed as markers represented by a single lit LED with one above and one below the reference which remain lit until Reset from the Control Panel.

Figure 9
Deviation Meter

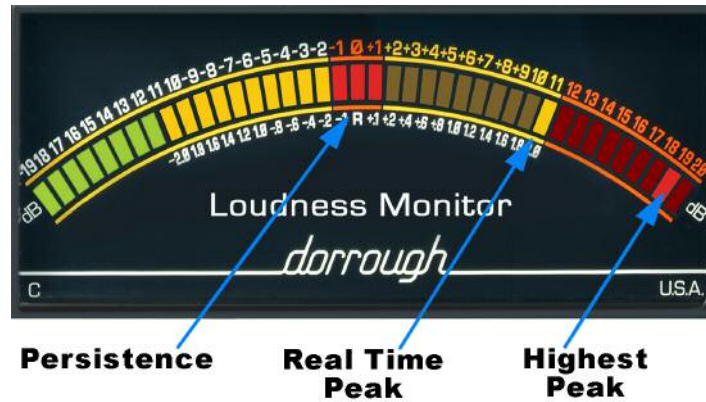


OPERATION

THE HIGHEST PEAK

Activating the Peak Hold button on the Control Panel permits the maximum or highest Peak to be displayed as a permanently lit LED. The active Peak is always displayed under this LED.

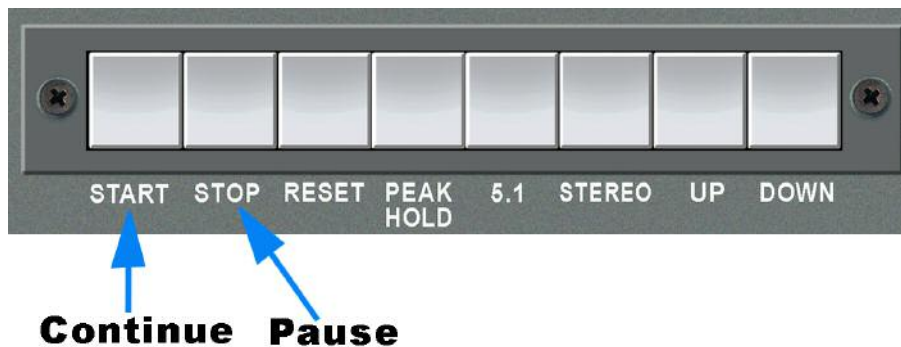
Figure 10 10-C



PAUSING A TIMED SEGMENT

If it becomes necessary to pause a timed segment, simply push the Stop button. All parameters remain in memory. To continue the segment, push the Start button. The Reset button when activated will clear the markers of the past segment and the unit is ready to begin a new measured segment.

Figure 11
Control Panel



REAR PANEL CONNECTIONS

The rear panel provides for the connection to electrical power via a separate standard **IEC power cord**.

XLR connectors provide for the connection of Left, Center, Right, Left Surround, Right Surround, and **LFE** analog inputs as well as, the connection of separate Left and Right Stereo **Analog inputs**.

A **25 pin “D”** connector is provided for the purpose of connection to an external analog display of the individual channels. Connections are per the TASCAM Technical Documentation **DB-25 Pinouts**.

TECHNICAL SPECIFICATIONS

Inputs:	XLR-3F 20k Balanced +24dBm Max (referenced to Digital Full Scale)
Outputs:	DB-25 duplicates inputs for external metering Tascam DB 25
Power:	100 to 240V 50/60 Hz audio select
Sample Rate:	48 kHz
Safety Code:	EN-55103-1 and EN-55103-2
Compliance:	ITU-R BS 1770, ATSC A/85, EBU-R 128
Warranty:	Three years