Operating Manual

PAM PiCo Touch

TSL | Products

Compliant Audio, Loudness & Logging System

PAM PiCo

PAM PiCo Touch

Handbook 1. Issue 1

INTRODUCTION

Before you begin...

Thank you for purchasing one of the PAM PiCo family members.

With the PAM PICO TOUCH you are well equipped to meet the growing challenges within Audio and Loudness metering.

The PAM PICO TOUCH complies with all major Broadcast loudness standards and delivers outstanding metering precision and clear Readouts, not merely on Loudness, but across the full range of audio metering tools.

The PAM PICO TOUCH toolset makes it application-fit for any audio and loudness setup in broadcast, film & post production as well as live transmission and recording.

With the clear PAM PICO TOUCH readout and compliance in your line of sight, you are always **safe and sound**.

About this manual

This manual will provide you with a quick overview of the PAM PICO TOUCH operation, tools and options, as well as an in-depth look at the more advanced parameters and facilities of PAM PICO TOUCH.

The manual covers the following product models:

PAM PICO TOUCH

PAM PICO TOUCH / R

Software versions: 01052014

Happy reading!

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Other Important Notes

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Purpose

Any fitness for purpose legislation or other determination that may be applied in the area where this equipment is installed must take due cognizance that it is designed for use in professional broadcast, audio and video systems by appropriately trained personnel. The equipment is not intended for use in a domestic environment and regulations designed for such situations are not applicable.

After sales modifications

Any modifications to the equipment not specifically authorised and approved by TSL Products may invalidate the equipment warranty. This includes changes to cabling and variations to the recommended installation as detailed in the documentation issued by TSL Products. Modifications can invalidate EMC and safety features designed into this equipment and the manufacturer cannot be liable for any legal proceedings or problems that may arise relating to such modifications. No sales agent or other person involved in the supply chain is permitted to authorise variations from the content of this documentation.

Important Safety Instructions

- Read these instructions. Study carefully and understand all safety and operating instructions before you install and operate the unit!
- Keep these instructions. Keep all safety and operating instructions for future reference!
- Heed all warnings on the unit and in the safety and operating instructions before you install and operate the unit!
- Follow all instructions to ensure against injury to yourself and damage to the unit or other objects connected to the unit.
- To prevent possible electrical shock, death, fire, injuries and malfunctions, use this product only as specified.
- Only use attachments and accessories specified by the manufacturer.
- The units of the PAM PiCo range are designed for indoor use only

PAM PiCo Touch – Quick Sheet

Change Scale & Loudness Setup

Touching the scale area allows access to Scale setup, Loudness Setup and Display mode (Moving Coil or Bargraph)

Meter Source Select

Touch the legend of the meter sources, to open and select from the list of input sources. Sources may be named to your liking.

Bargraph Options

Change colours, Over/Normal/Under levels. Assign 'Type' to specify what role the Bargraph represents e.g. Left, Right or other.

StarFish, Phase & TC Setup

Touch the Goniometer section to setup change StarFish setup.

Choose your Timecode source.

Text Read Outs

Touch the Text read outs to setup specific parameters viewed in the Text Field

Logging Application

PAM PICO TOUCH includes complete Loudness & True Peak Logging Application that may be downloaded **free of charge** from:

www.tslproducts.com

Exiting a Menu

Exit any menu by hitting the Menu Headline box..

Naming Presets

Open Preset List.

Press & Hold 'Preset name' for 3 secs to name preset.

Select / Customise

Press button for selecting function.

Press & Hold for 3 secs to change the function of the button.

Slide between three button sets.

Select / Customise

Press button for selecting function.

Press & Hold for 3 secs to change the function of the button.

Slide between three button sets: 'Loudness' – 'Preset' – 'Main'

On-screen display elements:

+1 / −1 CENTER L R LS RS

TSL

23:58:12:15

L R C LS RS INTE

−14 −17 −20 −23 −26 −29 −32 −35 −38 −41

-22.1 LUFS
SHORTTM 20.1 LUFS
LOUDNESS 4 LRA
PEAK LEVEL 3.5 MAX

MATRIX
GRAPH LEQ
GENERATOR
FFT 1024
PRESET
STARFISH

5.1 LU STEREO ALL CH 5.1 + START STOP RESET P-HOLD

Side button set:
LOUDNESS
PRESET
MAIN
PHSE SRC
PHSE SRC+
FFT1024 POINT
SETUP

STARFISH
GRAPH LEQ
FFT 1024 POINT
PRESET

Slide to change button set

ALL EMBED
AL AES
ANALOGUE
5.1 EMBED
5.1 AES
5.1 LR AE
BBC 1 AES
BBC 2 AES

Loudness Button Set:
SHORTTM INTEGRT HOLD CLEAR 3 SEC 10 SEC START STOP

Preset Button Set:
PRESET
ALL EMB ALL AES ANALOGU 5.1 EMB 5.1 AES 5.1 LR BBC 1 A BBC 2 A

Main Button Set:
PEAK HOLD CLEAR +20dB

Slide to change button set

Basic Operation

Touch Zones & Navigation

The PAM PICO TOUCH is a multi-touch sensitive device allowing for both slides, tap and Press & Hold functions.

The basic operation of the PAM PICO TOUCH is based on simply touch the area of the screen that you would like to interact with.

Touching
Touching a specific area, will call up the relevant menu points and allow you to alter settings in an instant.

Exiting a menu is always done by hitting the top menu bar on the left hand side.

Selecting a Parameter
When inside a menu, there are several ways of selecting a specific parameter.

1) Touching the desired parameter directly. This also used to open/close folders inside the menu structure
2) Sliding the menu until your parameter is in sight by simply sliding your finger up/down the screen on the mid-left hand side of the menu
3) Moving the cursor to the desired position by sliding on the far right hand side of the menu.
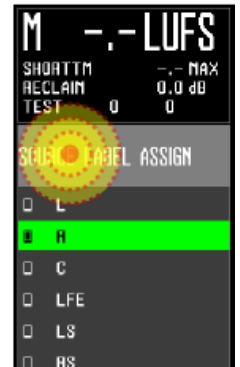
Auto Storing Feature in the PAM PICO TOUCH

The PAM PICO TOUCH features an 'Instant Store' facility that constantly stores any parameter change to the current preset.
This means that there is no need for manually storing presets, as your changes take effect at the moment of performing them

Meter Views – an Overview

This section gives you a quick overview of the different views available in the PAM PICO TOUCH.

StarFish View

The StarFish view builds on the heritage of the famous TSL Products MSD meter range and features a Vectorscope alongside a bargraph section allowing for both level and loudness views. In addition, the four text readouts are displayed on the upper right section of the screen.

In addition to the regular meters and Readouts, the StarFish view features a Timecode display below the StarFish®, which allows you to follow either the internal Timecode used during Loudness automation or external SMPTE timecode.

Moving Coil Mode

PAM PICO TOUCHs StarFish view offers and alternative setup showing Moving coils rather than bargraphs. There are two moving coil modes; 'regular' and 'dual' The 'Moving Coil dual ' mode allows you the ultra-wide Moving Coil instrument displaying left and right channel in the same instrument, while the regular mode will give you a separate moving coil instrument for each input channel.

Picture Preview

The Picture preview confidence monitor enables you to quickly monitor the picture from the incoming SDI stream (3G/HD/SD) to ensure that you are monitoring the correct stream. The Picture preview field may be turned on/off or 'dragged' in position and resized to your liking.
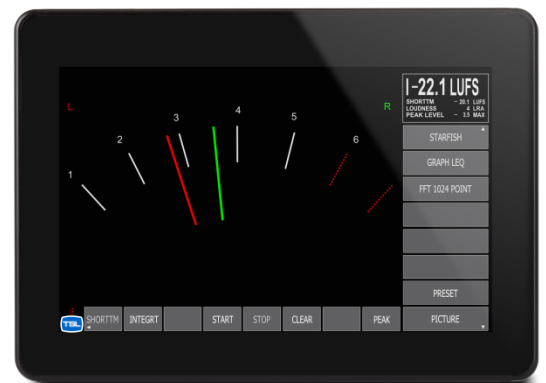
Graphical LEQ View

The Graphical LEQ view allows for several different simultaneous views.
On top of the four standard text readouts and phase meter, it features level Bargraphs adhering to the defined scale, while the dual Lo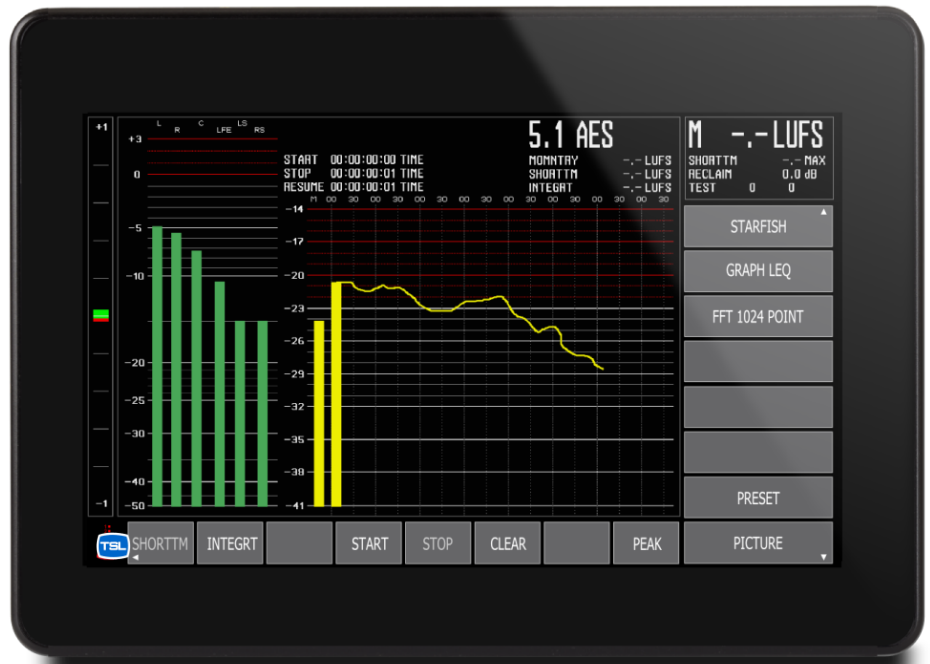udness bars are referring to the defined loudness scale. In essence, this means that two independent scales are viewed at the same time.

Furthermore, the Loudness level is plotted against time as a graphical track on screen, allowing for a historical view.
Loudness may also be logged via the PiCo Logging application against either internal time or external SMPTE timecode (free of charge).

Additionally, four extra text readouts may be defined on the top right section of the screen.

FFT 1024 View

The FFT view, simply features a 1024 band FFT spectrum analyzer.
The FFT analyzer may be used to check the spectral content of individual channels in great detail. This allows to check for unwanted noise signals, high and low, as well as review the spectral balance of your source signal.
The FFT features detailed cursor and Zoom functions allowing ultra high precision spectral review.
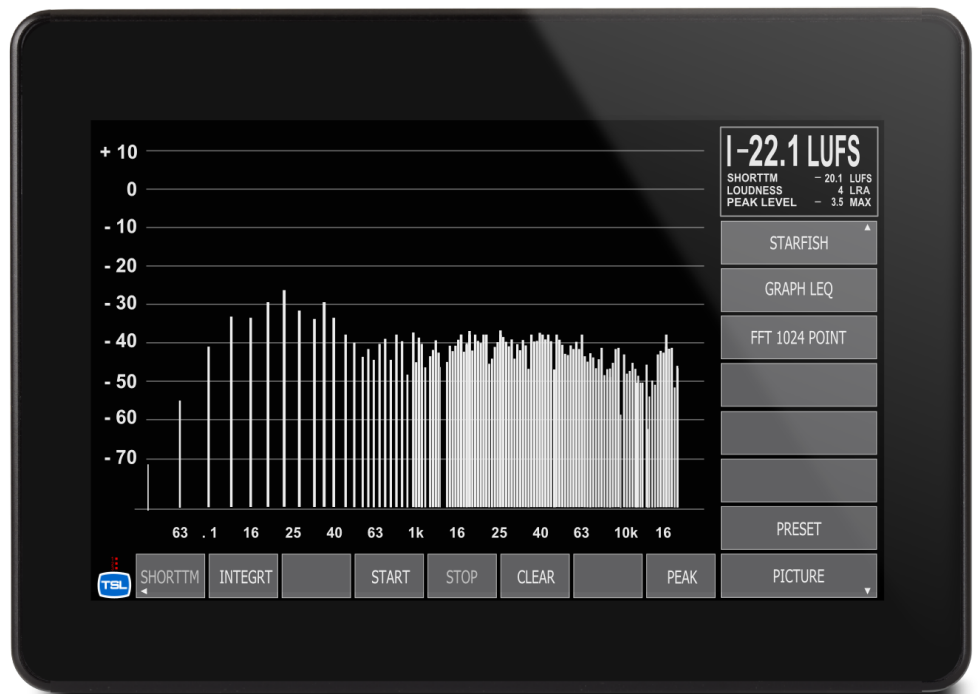
Source & Audio Routing

Understanding the Basic Signal flow of the PAM PICO TOUCH

As you are probably already aware, the PAM PICO TOUCH is a quite complex product with a lot of different signal routing sources and destinations i.e. SDI, AES, Analogue as well as internal signal sources with destinations of Bargraphs, Text Readout, StarFish, FFT, Loudness measurement and Downmix possibilities.

In order to simplify the overall routing, the PAM PICO TOUCH features a semi-automated routing scheme based on the different signal source **Types**.
This allows you to simply select the appropriate source and type/role for your bargraph meter and PAM PICO TOUCH will automatically define the rest of the routing.

For the same reason, it is very important for you to set up the bargraphs correctly, as this will define the rest of the metering setup.
There are three important parameters to be aware of in setting up your Bargraph meter:
- **Source** Select – touching the top legend bar of the meter
- Source **Label** or Naming – touching the top legend bar of the meter
- Defining the **Type** of your source – touching the actual bargraph element

Reading through the below # 1, 2 and 3 sections will give you an understanding of the basic setup parameters.
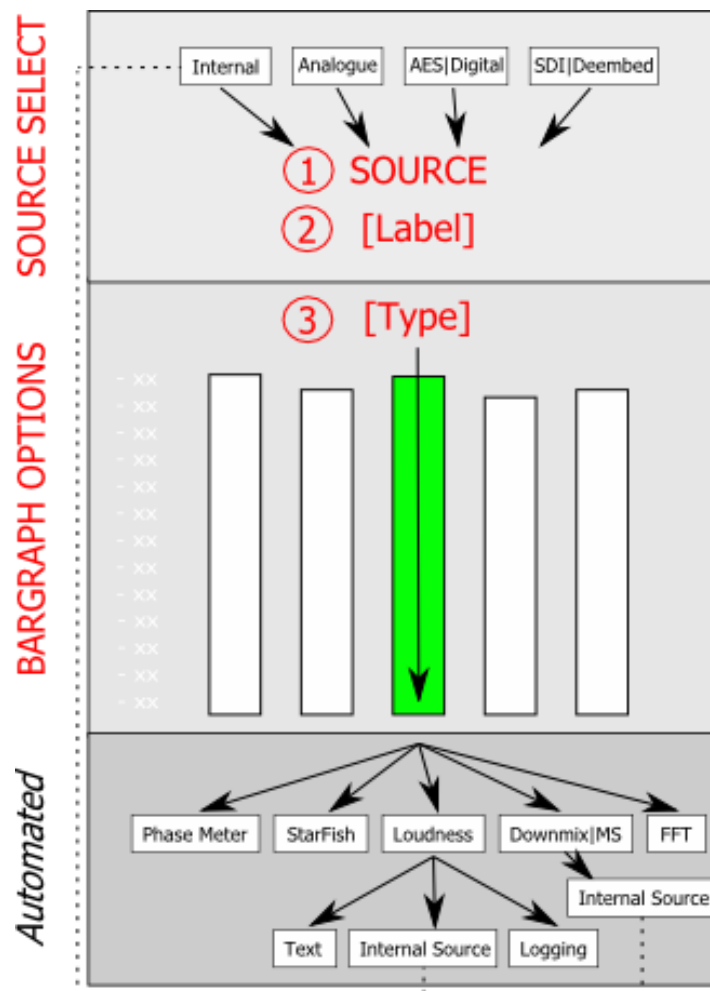
1 - **Source** Selection – Choosing your input

Touch the legend bar of the Bargraph and the source selection list will open up on the right hand side of the display.

Make sure to point to the specific Bargraph, that you want to alter the source for.

The source selection allows you to choose between a number of Internal and External sources (see below for details on the Source list)

Scroll the list to find the specific source that you are looking for.

The source chosen will be routed to the current bargraph – however, in order to make sure that the source is routed correctly, you need to ensure that the Label and Type set correct, please see section 2 and 3 for more details.

Source List

The Source list will display every available source on your meter including a number of internal sources with special functions that we will get back to.

The sources are grouped in Internal, Analogue, Digital (AES) and De-embedded (SDI) channels.

Each input source has a label as well as a unique ID number. While the label of each source might be changed to your liking, the unique number ensures that it is always possible to find out exactly what source you are working with.

Internal Sources

As mentioned, the Meter includes a number of internal sources that has specific functions like 'Off', Mix, Difference, Loudness etc.

These come handy when setting up special functionality like a Loudness Bargraph, adding MS indication to your meter view or routing the internal Tone generator outputs.

Analogue Sources

The two balanced Analogue sources have their own group. In most presets the analogue sources are labelled Left / Right respectively, assuming that they will be used for viewing an incoming signal.

The labelling of sources changes with the preset, so you might have different labels for the same source in different presets. Please see 'Label - Naming you input source' section below for more information on renaming your sources.

Digital – AES Sources

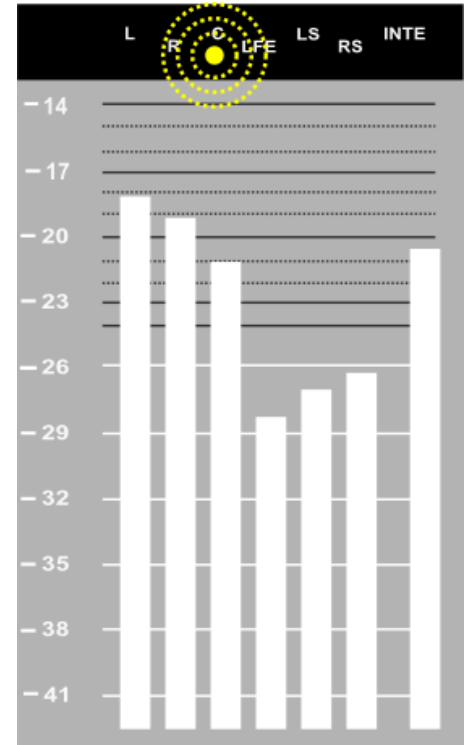The 8 digital AES channels, like any other source has unique ID numbers.

Again, the specific labels of each of the sources will change with the preset.

De-embedded – SDI Sources

The 16 SDI de-embedded channels, like any other source has unique ID numbers.

Specific labels may be altered and is stored with the individual preset.

Source List

Group	Source – Label	# ID	Note
Internal	Off	1	No input
Internal	TonL	3	Left output of the internal Tone Generator
Internal	TonR	4	Right output of the internal Tone Generator
Internal	Mix	5	Mono/Mix signal from the internal Downmix function
Internal	Diff	6	Difference signal from the internal Downmix function
Internal	Loud	7	Output from the internal Loudness measurement module
Analogue	e.g. L	33	Analogue input 1
Analogue	e.g. R	34	Analogue input 2
AES Digital	e.g. L, R, C, LFE, Ls, Rs	35-42	AES input channels 1-8
SDI De-embedded	1-16	129-144	SDI de-embedded channels 1-16

2 - **Label** – Naming your input source

Any input source label may be altered within each preset.
The PAM PICO TOUCH includes a default list of typical names for faster naming, but you might also define your own.
The Default Label list contains the following labels:

L	CL	MR
R	CR	SMPT
C	CS	AUX1
LFE	DIFF	AUX2
LS	MIX	1-8
RS	ML	-

Here is how to change a label to one of the default labels:
- Open the 'Source Selection' menu by tapping the specific source label that you want to change.
- In the 'Source Select' menu, Press and hold the label you want to change, for approximately 3 seconds and watch the 'Source Label Assign' menu pop up
- Now scroll to and tap the desired label e.g. 'R'.
- Hit the left side of the Top Menu bar to Exit.

Touch the Top bar to access the Source Selection Menu
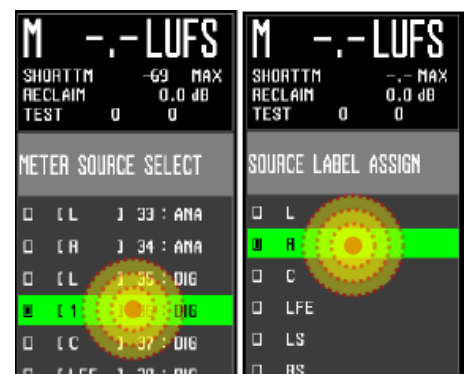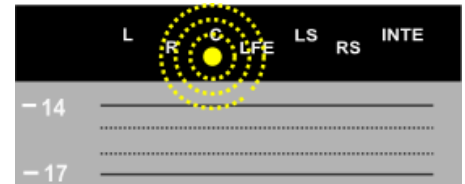
Creating your own Labels

In addition to the default label list, you may design your own. The process to enter the Source Label Assign menu is the same as above, but instead of selecting one of the default labels, scroll pass the default labels and tap the header called 'Edit Labels'. Below this header, you will see an additional 32 user labels that may be customized to your liking.

- Hitting the 'Edit Label' header will bring up the keyboard and allow you to enter your desired label.
- Once satisfied, tap the label position that you want to carry the new name and hit 'Done' – this will save the new label as well as attach it to the source that you started out with.
- Hit 'Quit' to leave the Keyboard
- Hit the left side of the Top Menu bar to Exit.

3 - **Type** selection – Defining the role of your source

As mentioned earlier, the selection of the correct type or role of a specific source, is essential to the automated routing of the source signal.

An example of why that is:

If your incoming source is defined as a 'R' right channel type, the PAM PICO TOUCH automatically knows that this source needs to be routed onto the Phase correlation meter, the StarFish Right channel input as well as the Loudness measurement block and the Downmix module.

In case the type was changed to 'Ls', the PAM PICO TOUCH would not only change inputs on the various other metering, but also make sure to compensate gain when calculating Loudness as per the BS1770 standard Loudness definition.

The Bargraph Options menu gives access to a lot of different bargraph parameters that we will get to a bit later. For now, let's make sure that the Type is set correctly.

Touch the Bargraph to access the Bargraph Options Menu
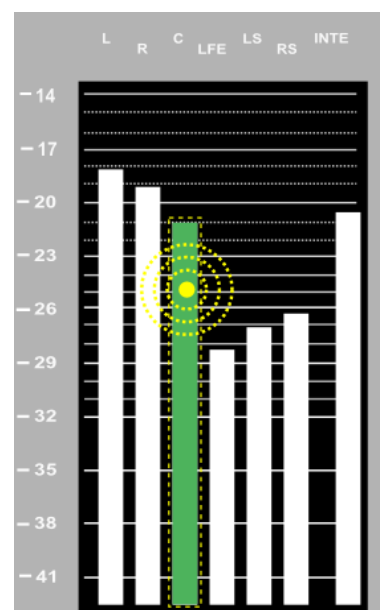
Hit the Header called 'Labels Assign' and you will see the different types.

INP	RS
L	CL
R	CR
C	CS
LFE	LOUD
LS	OFF

As might notice, a lot of these types are identical to some of the Default Source labels mentioned in the Label section above. If you have chosen one of these default labels, you can simply select the Type to be 'INP' for 'Input'. This means that that the PAM PICO TOUCH will look to the Input Source Label to learn what type of signal your source is.

PLEASE NOTE: if the type is set to INP without having a relevant Source label selected, the Type will essentially be ignored which could cause the source to not be routed to the appropriate instruments and measurements.

You can always manually select the specific Type that your source signal represents, in order to make sure that it will routed correctly.
Hit the 'Bar Options' header on the left hand side to exit the menu.

Set Up Bargraph Options

Colours, Colour level & Bargraph Width

The Bargraph options menu that we already talked about in the Source and Audio Routing section, contains a number of other relevant parameters for defining the look and behavior of your Bargraph elements i.e. **Labels Assign, Bargraph Width** , **Colour Normal, Colour Under, Under Level.**

Touch the specific Bargraph you want to alter, and the menu will open up on the right hand side.

Labels Assign

This menu we already talked about earlier.
It allows you to assign one of the default labels or make one of your own for each of the Bargraphs.
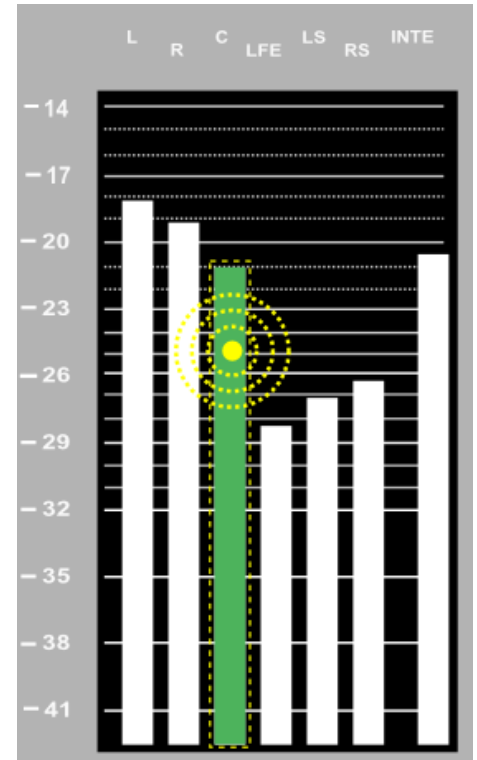
Bargraph Width

This section allows you to define the width of each of the up-to 16 Bargraphs in the PAM PICO TOUCH.

Please Note, that the PAM PICO TOUCH has an automated scale function that will adapt both the StarFish and Bargraph area to maximize the use of the display real estate. This means that the more and the bigger the bargraphs are, the smaller the StarFish area becomes, until it reaches its minimum size, in which case the Bargraph width is truncated.

Color Normal

Each scale includes a defined 'Peak' level where the scale turns red. In addition to the Peak area, the PAM PICO TOUCH allows you to define colour of the 'Normal' area. The 'Colour Normal' sets the color of each Bargraph below the 'Peak level' in the 'Normal' area.

Colour Under

A threshold defines when the input signal is considered 'under' the 'Normal' level.
The 'Colour Under' sets the color of each Bargraph, when below the defined threshold.
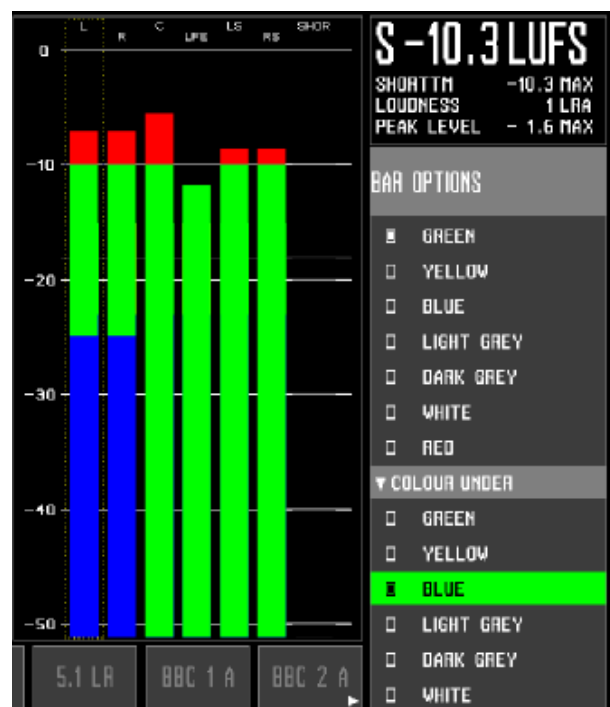
Under Level

Range: 0 to -25dB

The 'Under Level' determines when the signal is considered 'Under' the normal level.

Set Up Scale & Loudness Format

Touch the Scale area to access the Scale & Loudness Menu

Touching the Scale area of the Bargraphs will open up the Scale and Loudness menu, allowing you to define what scale and Loudness format you want your meter to adhere to.

The parameters in this menu counts: **Scale, Under Level, Loudness Preset, Loudness Setup, Loudness Option.**

Scale

This section allows for a choice of numerous different scales.

Here is the list of scales included in the PAM PICO TOUCH:

Scale	Note
I	IEC 268 I – PPM Nordic
BBC	IEC 268 IIa
IIB	IEC 268 IIb – Transmission
DIN	DIN scale
VU	SMPTE V, +3/-20dB range
FBTV	DIN
NBC	Utra VU, 0/-60dB range
LEQM	RMS LEQ
ITU	RMS LEQ R128 scale
DMU1	DMU1630
DMU2	DMU1630 Zoomed 6dB range
40A	Dorrough 40A
40C	Dorrough 40C
EBU	IEC 268-18
WEBP	Web Peak – Digital scale +3dBFS true peak
BBC	IEC268IIa + Shortterm Loudness reading
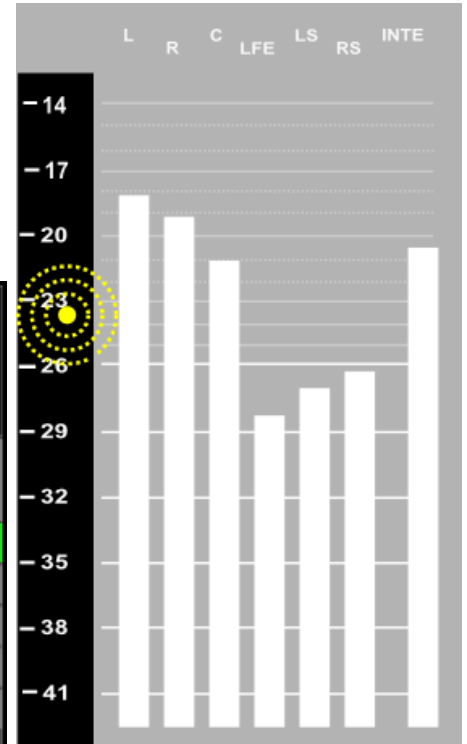
Tap the desired scale for your meter.

Under Level

Range: 0 to -25dB

The 'Under Level' determines when the signal is considered 'Under' the normal level.

Loudness Preset

The Loudness setup parameter allows you to select between a number of standardized or recommended Loudness settings including:

R128	ATSC A/85	LEQM
BCAP	TV2 DK	ABC-TV LA
HRTV-23FS	ARIB	AGCOM 219

If you select 'User', two additional folders open up called **Loudness Setup** and **Loudness Option**.
These two folders enable you to completely customize the Loudness measurement to your exact specifications.

Loudness Setup

The Loudness Setup folder allows you to customize the loudness settings of your meter.
You may use one of the Loudness presets as a starting point.

Tip: Select the Loudness Preset that comes closest to your desired loudness setting, then select the 'User'
Loudness Preset in order to customize the details.
Your changes will automatically be saved to the current preset.

Filter

Range: LEQM, K-Filter, Off
Sets weighting filter applied to the Loudness measurement.
ITU BS1770 loudness recommendation (R128, A/85) specifies K-filter weighting.

Scale Mode

Range: LU, LUFS, LKFS
The LU scale allows for a relative reference point in the loudness e.g. EBU R128 will mean 0LU=-
23LUFS, while SMPTE A/85 would mean 0LU = -24LKFS. The specific reference point may be
chosen via the 'Reference' parameter explained below.
LUFS and LKFS scales are identical scales, LUFS being used by EBU, while LKFS is used by
SMPTE.

Short-term Window

Range: Momentary, 3, 10 or 30 seconds.
The currently displayed loudness value is based on the averaged loudness values over the
defined time window. Setting the window to 'Momentary' essentially turns the Short-term
loudness reading into 'Momentary' loudness based on a sliding 300ms window. Please note that
the PAM PICO TOUCH already offers the Momentary reading alongside the Short-term loudness.

Reference

Range: -9 and -24 dBFS (1 dB steps).
A range of Reference levels can be chosen for the purpose of loudness measurement as part of
the loudness measurement standard which your organization (or client) has adopted.
EBU R128 specifies -23LUFS as the reference point.
SMPTE A/85 specifies -24LKFS as the reference point.

Peak Level

Range: -1 to -10 dBFS (1 dB steps).
The Peak level is a user defined reference point.
The peak level is dependent on the setting of 'Peak Mode'; True Peak or Digital (Sample Peak).
When the signal passes above the peak level, the Peak level readout will turn Red.

Gate Level (-a)

Range: -8 to -20 dB (1 dB steps).
It is the high level parts of a program which are often of most interest for assessing compliance with broadcast criteria. To prevent an extended length of low level program content reducing the averaged loudness value to a degree that affects the measured value, the meter has an optional gating function. Once the signal drops below the gate threshold, the meter will continue to hold, display and use for averaging purposes, the previous value that was above the threshold. Setting it to -20 causes the gate to remain open and the unit displays the actual loudness for the vast majority of the time.
ITU BS1770 recommends a -10dB relative threshold for the loudness gate.

Gate Level (-b)

Range: Floating or Absolute.
The gate level can be an absolute value or a floating one. Absolute values offer a degree of simplicity but at the risk of a high setting causing gating of quieter sections which might sometime comprise a significant part of material such as a feature film soundtrack. Adopting a low absolute value can cause background noise that is at a relatively high level (for example a documentary by a waterfall) not to be gated out, even though it is not a significant contributor to the perceived loudness. Making the gate level relative may then offer results that more closely reflect perceived program loudness.
Most international loudness recommendations specify a relative gating scheme.

Peak Mode

Range: Digital or True Peak.
Selecting Digital will base the reading on individual sample values.
True Peak uses oversampling to create the maximum intersample peak possible taken from the maximum value of the interpolated wave shape.
ITU BS1770 specifies 'True peak' as the correct peak mode.

Reference

This is the frequency chosen for the calibration alignment and is either 400 or 1000 Hz.

Capture

The Loudness capture functionality may be changed between two different modes; Start-Pause and Auto-Start.

Loudness measurement or Capture is essentially always done over a timespan - hence, it is necessary to define when the Loudness capture starts and stops.
As explained in the Loudness & Terminology section, several different Loudness measures are relevant i.e. Momentary Loudness, Short-term Loudness, Integrated Loudness and Loudness Range – all time dependent.

The Start-Pause Mode
Is in effect a manual mode that allows you to decide when the Loudness capture starts, pauses, and restarts or is reset.
The button expresses the Loudness capture state the meter is in, e.g. 'Start' indicates that the Loudness Captured has been started.
Loudness Capture is dependent on the incoming signal being higher than -70dBFS.

During the Loudness capture, you may now toggle the capture between 'Start' and 'Pause'. The overall resulting loudness readings will express the summarized capture of all audio above -70dBFS from the last Reset.

Hitting 'Reset' will re-initiate the Loudness Capture and measures.

Overall, the Start-Pause mode allows you to manually start and stop the capture during breaks or audio that you do not wish to consider in the overall loudness readings.

> *Note: As per the BS1770 standards, audio below -70dBFS is not included in the overall loudness capture. This is to avoid that breaks or silence in the audio undermines the loudness readings.*

Auto-Start Mode

The Auto-Start mode has controls and options similar to those of the Start-Pause Mode, with the addition of an automatic start/reset facility triggered by the audio level.
More specifically, if the audio is higher than -70dBFS, the Loudness Capture is automatically started, as well as being automatically stopped and Reset when the audio drops below -70dBFS again for more than 2 seconds.

This mode is particularly handy when working with smaller bits of audio, and frees you from having to manually reset the loudness capture every time you want a new reading.

Loudness Option

The Loudness option section allows you define what loudness parameter you wish displayed as the Loudness Bargraph as well as setting up the Capture mode of your loudness measurements.

> *Note: Enabling a Loudness Bargraph requires audio to be routed to the relevant bar graph position.*

Capture

The Loudness capture functionality may be changed between three different modes; Start-Pause, Auto-Start and Auto-LTC.

Loudness measurement or Capture is essentially always done over a timespan - hence, it is necessary to define when the Loudness capture starts and stops.
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The button expresses the Loudness capture state the meter is in, e.g. 'Start' indicates that the Loudness Captured has been started.
Loudness Capture is dependent on the incoming signal level being higher than -70dBFS.

During the Loudness capture, you may now toggle the capture between 'Start' and 'Pause'. The overall resulting loudness readings will express the summarized capture of all audio above -70dBFS from the last Reset.

Hitting 'Reset' will clear the loudness Capture and measurements.

Overall, the Start-Pause mode allows you to manually start and stop the capture during breaks or audio that you do not wish to consider in the overall loudness readings.

> *Note: As per the BS1770 standards, audio below -70dBFS is not included in the overall loudness capture. This is to avoid that breaks or silence in the audio undermines the loudness readings.*

Auto-Start Mode
The Auto-Start mode, has controls and options similar to those of the Start-Pause Mode, with the addition of an automatic start/reset facility triggered by the audio level.
More specifically, if the audio is higher than -70dBFS, the Loudness Capture is automatically started, as well as being automatically stopped and Reset when the audio drops below -70dBFS again for more than 2 seconds.

This mode is particularly handy when working with smaller bits of audio, and frees you from having to manually reset the loudness capture every time you want a new reading.

Auto-LTC – Loudness Automation
The Auto-LTC mode automates the Loudness capturing based on incoming LTC / SMPTE timecode.
This is an extremely efficient audio production mode, as it features instant recalculation of all Loudness capture results when editing even tiny bits of the audio clip.
Imagine wanting to measure and adjust loudness for an audio clip of 5 minutes, but really only altering the audio in a section of 30 seconds. This would normally mean that you would have to allow the Loudness measurement to go over the entire 5 minutes after every edit.
With the Loudness Automation feature, the PAM PICO TOUCH automatically identifies what section of the audio is being altered based on the incoming timecode and instantly recalculates the complete loudness result.

Please see the 'Loudness Automation' section for further details on how set this up.

Loudness Display
The Loudness parameters available for display are the following:
- Momntry – 'Momentary Loudness'
- Shorttrm– 'Short-term Loudness'
- Integrt – 'Integrated Loudness'
- None – Meaning no Loudness Bar graph displayed
- Momentry+Shortterm – both readings alongside each other

Set Up Meter Text

Read-out
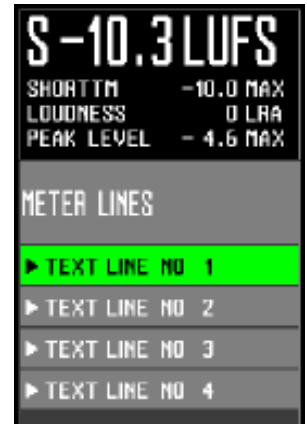
Hit the Text Read-out area to open up the Meter lines menu.

The menu contains the settings for the four Text lines of the PAM PICO TOUCH display.

Line 1 is always in a bigger font, while 2, 3 and 4 are small font.

It is completely up to you what information you want to display in each line.

A number of different parameters are available for display:

| Parameter	Note
Off	The Line is removed
Loudness Select	Will show Integrated or Shortterm loudness depending on what is Selected (see button setup for details)
Momentary	Momentary Loudness
Shorttrm	Shortterm Loudness
Integrated	Integrated Loudness
Loudness LRA	Loudness Range
Reclaim Factor	Reclaimin Factor
Momentary Max	Max. Momentary Loudness reading
Shortterm Max	Max. Shortterm Loudness reading
Gate Hold	Indicates whether the Loudness gate is on hold or capaturing data
Peak Level Max	Max. True Peak
SMPTE Time	Incoming SMPTE time display
Start Time	
Stop Time	
Resume Time	
Shortterm Time	The time of the sliding Shortterm Loudness Window 3, 10 or 30 seconds
Filter Type	Loudness Filter used K-Filter or LEQM
Preset Audio	The name of the current preset
Volume	Volume level, used for controlling Headphone out (TBA)
Loudness Preset	The current Loudness Preset being used.
Reserved	For future use

Set Up StarFish, Timecode and Phase Meter

Touching anywhere in the StarFish area will open up the StarFish and Timecode menu including: **Compressor, OP-mode and Timecode.**

Compressor

The compressor section allows for different performance parameters to be set up. Fast / Slow parameters controls the Phase correlation responds time. In particular, when reviewing phase relation of low frequency content, the 'slow' position might come in handy.

The Gain On/Off parameter allows the Goniometer and StarFish™/JellyFish™ to always in a relevant size, but adding gain to increase the visual appearance of each of the instruments.
The gain is evenly distributed meaning that the channel relationship is kept complete and can always be trusted to give a correct representation.
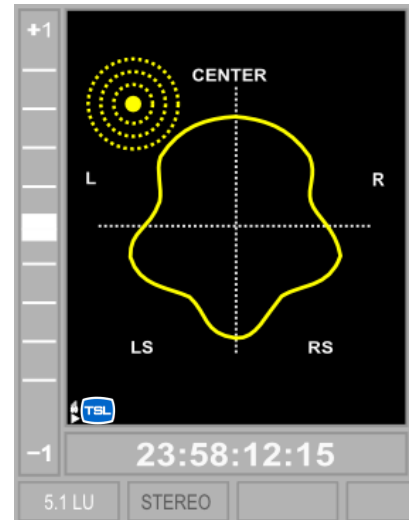
OP-Mode

The operating mode allows you to choose between running the StarFish™ or JellyFish™. Please refer to the instrument section for further information on each of the two.

Selecting Phase Correlation Sources

The PAM PICO TOUCH allows you to freely define what two channels phase relationship is expressed by the Phase correlation meter.

In order to change the Phase sources, slide to the top set of vertical buttons and hit the 'PHSE SRC' button and the horizontal row of buttons turns into Phase correlation source selection of the first 8 incoming channels.

In case you need to select sources from ch.9-16, you will need to enable the 'PHSE SRC+' function.
Press and hold an empty on screen button for about 3 seconds and then select 'PHSE SRC+' from the list. Now you have access to selecting ch. 9-16 as sources for the Phase correlation meter as well.

Exiting the 'Source list' mode can easily be done by hitting one the standard button sets [Loudness], [Preset] or [Main].
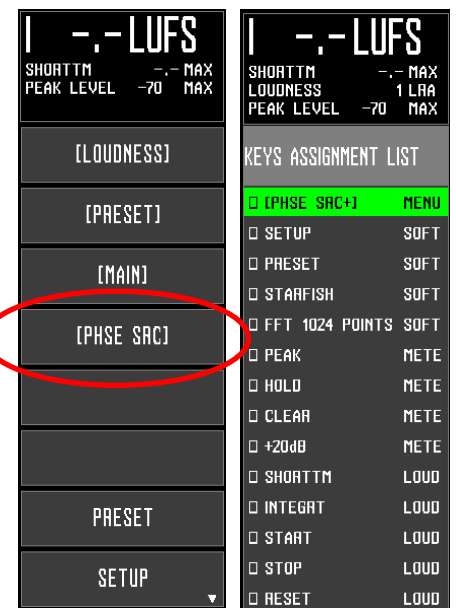
Timecode

The Timecode section allows you to choose what timecode should be displayed below the StarFish area; Internal Timecode, incoming SMPTE Timecode or off position.

Incoming SMPTE code must be feed through the Right Analogue input (input2).

PAM PICO TOUCH is capable of automating Loudness capturing based on incoming Timecode, a very handy and time saving production feature.

'On-screen' Button sets

Horizontal & Vertical

The PAM PICO TOUCH features a set of eight buttons both horizontally and vertically.
In fact both the horizontal and vertical set of buttons feature no less than three sets of eight buttons, that may be changed between by a simple 'swipe' across the button bar.

Every one of the buttons can be customized to perform exactly the function you require in a matter of seconds, rendering an extremely powerful ability to restructure the user interface to your needs.
This may be used completely as you wish e.g. having a button strip with immediate access to the top 8 presets of the PAM PICO TOUCH, another with Loudness Start/Stop/Reset Functions and likely one to allow switching between the different Metering Views; StarFish, Graphical LEQ, FFT and possibly a direct access to the internal Tone Generator or something completely different.
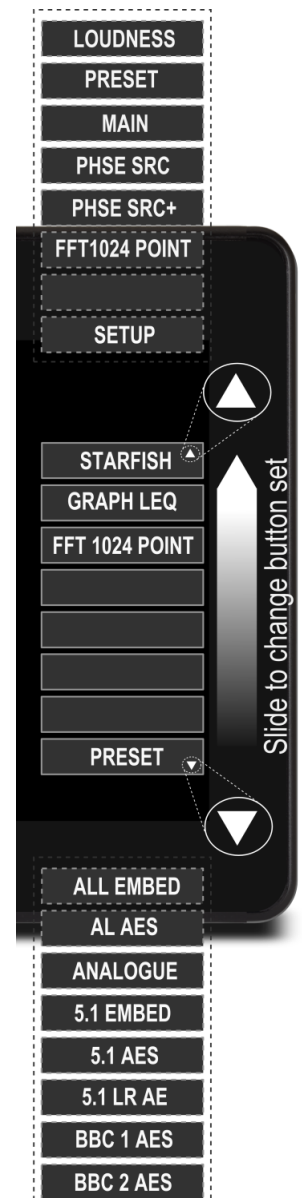
In order to change specific button function, simply Press & Hold for approximately 3 seconds and you will see the function list pop up in the menu area.
Scroll and tap the function you want the current button to perform and Exit by hitting the topbar on the left hand side – you are done.

TIP: The vertical and horizontal button strip last edited will automatically be called up as the default strip after power up-

Here is the list of available button functions:

Function	Group	Note
None	Preset	Blank Button
[preset 1 name]	Preset	Recalls # Preset
[preset 2 name]	Preset	Recalls # Preset
[preset 3 name]	Preset	Recalls # Preset
[preset 4 name]	Preset	Recalls # Preset
[preset 5 name]	Preset	Recalls # Preset
[preset 6 name]	Preset	Recalls # Preset
[preset 7 name]	Preset	Recalls # Preset
[preset 8 name]	Preset	Recalls # Preset
[preset 9 name]	Preset	Recalls # Preset
[preset 10 name]	Preset	Recalls # Preset
[preset 11 name]	Preset	Recalls # Preset
StarFish	Application	Selects StarFish View
Graph LEQ	Application	Selects Graph

LOUDNESS
PRESET
MAIN
PHSE SRC
PHSE SRC+
FFT1024 POINT

SETUP

STARFISH
GRAPH LEQ
FFT 1024 POINT

PRESET

Slide to change button set

ALL EMBED
AL AES
ANALOGUE
5.1 EMBED
5.1 AES
5.1 LR AE
BBC 1 AES
BBC 2 AES

		LEQ View
FFT1024	Application	Selects FFT View
Loudness	Menu	Calls up the Horizontal Button set called 'Loudness'
Preset	Menu	Calls up the Horizontal Button set called 'Preset'
Main	Menu	Calls up the Horizontal Button set called 'Main'
PHSE SRC	Menu	Calls up 'Phase meter' source select button set 1-8
PHSE SRC+		Calls up 'Phase meter' source select button set 9-16
Setup	Software	Access the Advanced Setup Menu
Preset	Software	Access the Preset List in the Advanced Setup Menu
FFT1024	Software	Selects FFT view and Adds Vertical FFT button set
Peak	Meter	Enables Peak indication on the Bargraphs
Hold	Meter	Enables Peak hold indication on the Bargraphs (requires Peak to be enabled)
Clear	Meter	Clears Peak Hold
+20dB	Meter	Gains meter input by 20dB to allow 'zoom' on lower level signals
Shorttrm	Loud	Selects Shortterm Loudness indication in Text Readouts set to 'Loudness Select'
Integrated	Loud	Selects Integrated Loudness indication in Text Readouts set to

|			'Loudness Select'
Start		Loud	Starts Loudness Reading
Stop		Loud	Stops latest Loudness Reading
Resume		Loud	Resumes the current Loudness Reading
3 Sec		Loud	Sets Shortterm Loudness Window to 3 sec
10 sec		Loud	Sets Shortterm Loudness Window to 10 sec
30 sec		Loud	Sets Shortterm Loudness Window to 30 sec
Left		Function	Selects Left Input only
Right		Function	Selects Right Input only
Test	Function	Reserved for internal use	
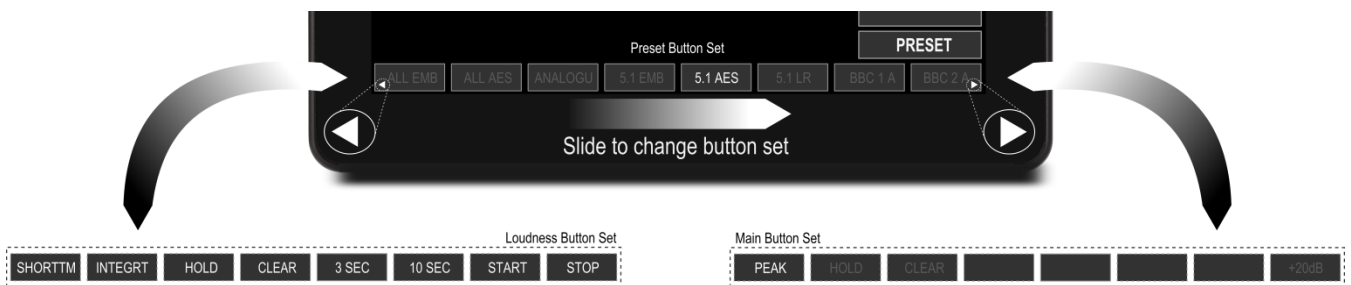
Loudness Automation

PAM PICO TOUCH features a unique ability to automate and instantly recalculate Loudness results based on incoming timecode.
The only requirement is that you have an LTC / SMPTE timecode available along with your audio signal.
The benefit is a much more efficient workflow and a drastic reduction in time spent on measuring the final Loudness result.

Imagine wanting to measure and adjust integrated loudness for an audio clip of 5 minutes, but really only altering the audio in a section of 1 minute. This would normally mean that you would have to allow the Loudness measurement to go over the entire 5 minutes after every edit.
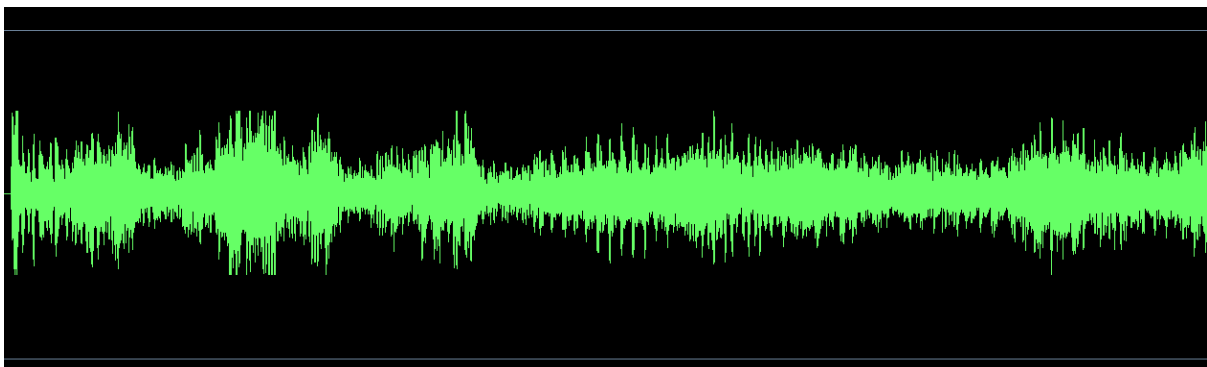
Normal Loudness Capture: Running through all 5 minutes of audio to measure Integrated Loudness
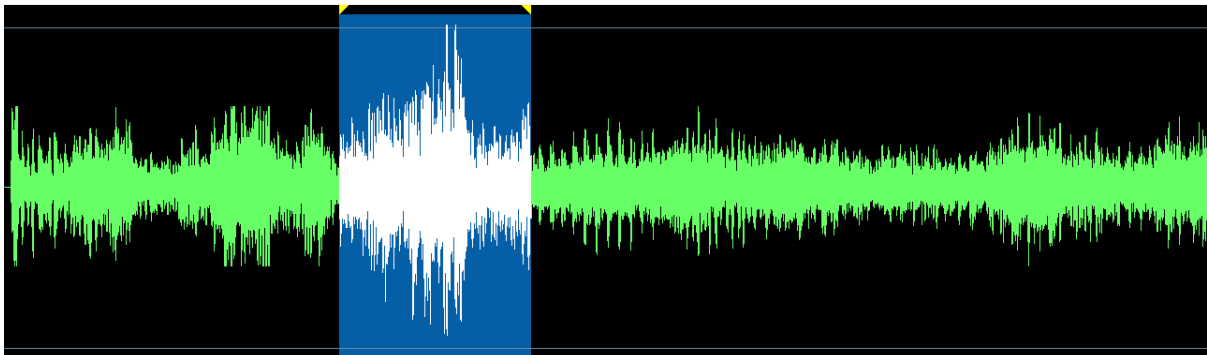
Loudness Automation: Based on timecode, PAM PICO TOUCH captures only the edited audio bit and recalculates Loudness

With the Loudness Automation feature, the PAM PICO TOUCH automatically follows your timecode while editing and instantly recalculates the resulting Integrated Loudness with no need to measure the entire audio clip again.

In essence this means a significant reduction in time needed to tweak and recapture Loudness for a final Integrated loudness result.

Loudness Logging

The PAM PICO TOUCH is capable of streaming its loudness data to its companion PC application PiCo Logging, which is available as a download free of charge for all PAM PiCo TOUCH and PiCo1, PiCo2, PiCo5 models from here:
http://www.tslproducts.com/support/software-updated-applications/

The Loudness Logging data is captured through the USB connection and allows for detailed review, analysis and reporting of the different logged parameters.
Also, the Logging application may started and stopped automatically based timecode entries of your choice.

Setting up Moving Coils

As mentioned earlier, PAM PICO TOUCH is capable of showing moving coil instrument emulations as opposed to the default bargraphs.
Here is how to set it up:
- Once you have selected your sources and scale go to the folder called 'Display Mode' (only visible with less than 4 input sources).
- Select 'Moving Coil' and you will instantly see number of Moving coils corresponding to you input sources
- Tapping the Moving Coil Dual parameter will give you a dual needle instrument instead.

- It is possible to disable the StarFish / Goniometer allowing the Moving Coil display to fill the entire view. Here is how to disable the StarFish:
- Slide to the first vertical button set and press [PHSE SRC].
- This shows the sources feeding the phase and Goniometer.
- Disable the source by tapping each one – Now the Gonio meter and phase meter will disappear.
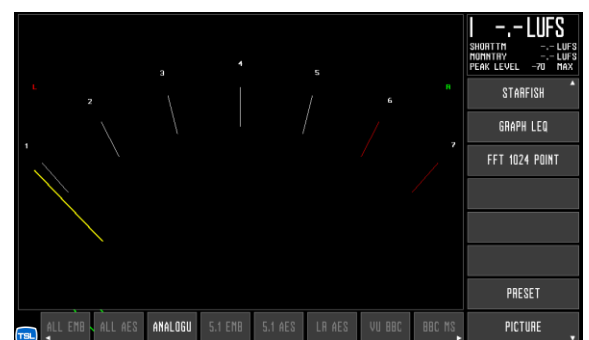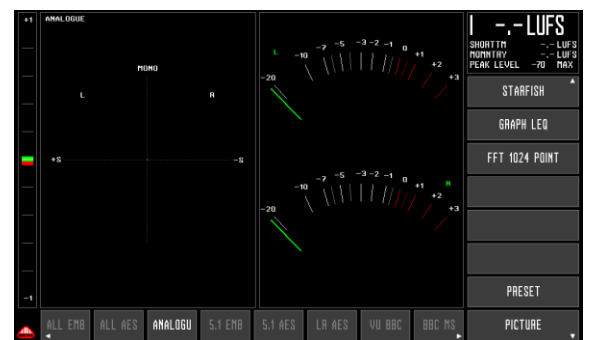
Using PAM PiCo Matrix II

Setup Editor

The PiCo Matrix II Setup Editor, allows you to quickly and easily get an overview of the sources and destinations of your meter. Also, the bargraph width, normal and under colour can quickly be set up via PiCo Matrix. Furthermore, PiCo Matrix for easy back and replicating the same setup across several meters.
PiCo Matrix II is compatible with PiCo 1, PiCo 2, PiCo 5 and all of the Touch models and allows for presets and setups to copied across the different models (given that they share the relevant source inputs and tools).

For more information and free of charge download, please refer to TSL Products website.
www.TSLProducts.com.
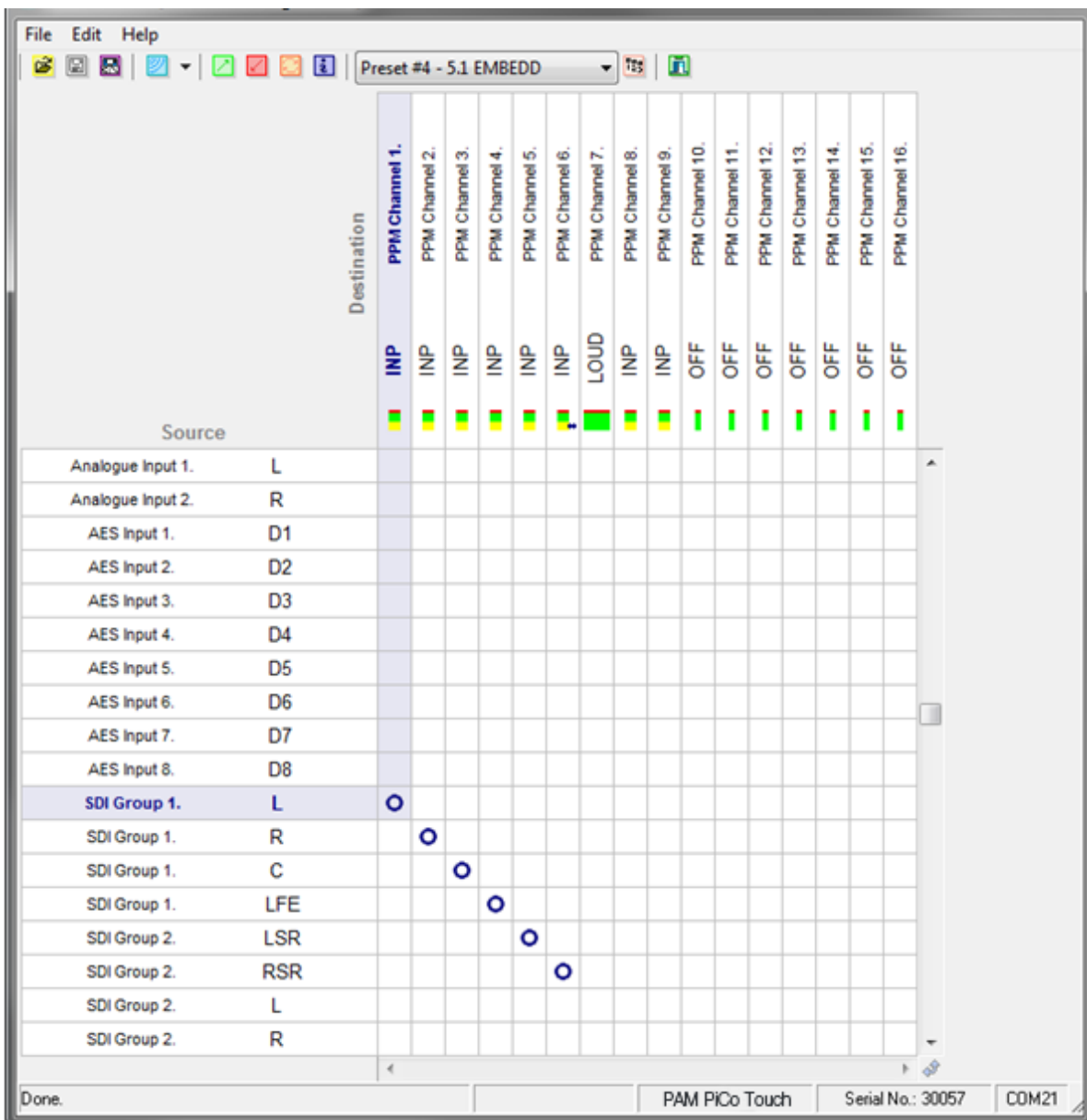
Set Up Picture Preview

The SDI Picture preview function of the PAM PICO TOUCH is enabled/disabled by hitting the 'Picture' button defaulting to the lower position of the vertical button set.
Upon pressing the 'Picture' button, the embedded video stream of the incoming 3G/HD/SD SDI input is super imposed on top of the regular metering information.

Altering Picture Preview Position

The Picture Preview on screen position may be change by simply 'dragging' it onto the desired position of the screen.

Altering Picture Preview Size

The size of the Picture Preview may be changed by simply pressing the top or bottom of the picture frame .
Pressing the lower section of the picture will increase the preview size.
Pressing the upper section of the picture will decrease the preview size.

Security Lock

The PAM PICO TOUCH features a security lock function allowing you to block for access to background setup parameters and menus through a four digit code.
The security lock function is called up by pressing the TSL Products logo in the lower left corner of the screen.

Security Locking your device

The PAM PICO TOUCH is shipped with a default un-locked factory setting.
In order to enter your own code, hit the backspace button and delete the four * characters.
Now enter your own four digit code.
Hit the 'Save' button – you will now see the Password status change from 'unlocked' to 'locked' in the right hand side of the display.
Hit 'Quit' to exit the Security menu.
All menus and background parameters are now locked. Any attempt to enter these, will call up the password screen and require backspacing and re-entering the four digits.
Once the four digit code has been re-entered, hit 'Done' to unlock your device.

Preset Handling

Preset Storing

The PAM PICO TOUCH instantly stores any meter parameter change in the current preset.
This means that you do not have to go through any store process in order to maintain the settings just changed.

Naming a Preset

Any of the 11 presets of the PAM PICO TOUCH may be named to your liking.
In order to change the name of the Preset, you have to open the 'Preset Menu' as opposed to simply hitting a preset on the on-screen buttons.
Press & hold the preset name that you want to change for approximately 3 seconds.
The Keyboard pops up and you may name your preset. Once the naming is correct, hit 'Done' to transfer the new name to the current preset.
Hit 'Quit' to close the keyboard.
Hit the topbar left hand side to Exit the Preset Menu.

Default 'Power On' Preset

The PAM PICO TOUCH has the ability to power on with a particular preset.
In order to set the 'Power on' preset, open the 'Preset Menu' and select the preset you would like to see after a power up.
Now exit the Preset Menu by hitting the top bar left hand side.
Your PAM PICO TOUCH now has a new power on default preset.

The Advanced Setup Menu

The Setup Menu

The Setup Menu holds the access to all of the background parameters of your PAM PICO TOUCH. Most of the functions we have already covered in the earlier sections. The setup menu is reach by pressing the 'Setup' button. Default position is on the first vertical button set.

About

The 'About menu' holds technical background information about the software and hardware configuration of your unit as well as the settings for the External Monitor setup (HDMI out).

External Monitor
The HDMI output of the PAM PICO TOUCH replicates the internal display 1:1.
The HDMI output defaults to 'Full' mode
Most monitors today are able to accept this mode.
In case your monitor does not allow this mode, you may select the 'Center' mode which is a scaled version of the

Software
This folder contains a number of version numbers for the relevant software parts of you unit including release date of the current software of your unit.

Hardware
Contains a number of version numbers for both hardware and firmware of your unit.

Preset

The Preset folder contains all the background paratmeters stored inside the PAM PICO TOUCH presets.
All of these parameters can be accessed through the direct 'touch' functions outlined earlier.
Please referrer to the earlier sections of this manual for further details on preset parameters.

Audio Global

The Audio global folder contains a few global settings for the PAM PICO TOUCH

Analogue Reference levels
The analogue reference sets the sensitivity of the analogue inputs.
In essence the sensitivity decides how many dBU it takes to fully reach maximum input or 0dBFS e.g. +18dBu means that an analogue signal of 18dBu will reach 0dBFS in the PAM PICO TOUCH.

Downmix settings
The Downmix settings are used for allowing a stereo down-mix to be created and viewed from an incoming surround set of channels.
The 'Output gain' is the attenuation compensating for potential clips when joining the 6 channels together.
'Center to L/R' sets the level that the Center channel is mixed by.
'Mode' decides whether the Downmix facility is on or off.

Instruments & Display Tools

Bargraphs

The standard Bargraphs can be used to view numerous different representations of the incoming audio e.g. level according to the selected scale, various loudness parameters, sum/difference and more.
PAM PICO TOUCH allows up to 16 simultaneous Bargraphs to be viewed at the same time.
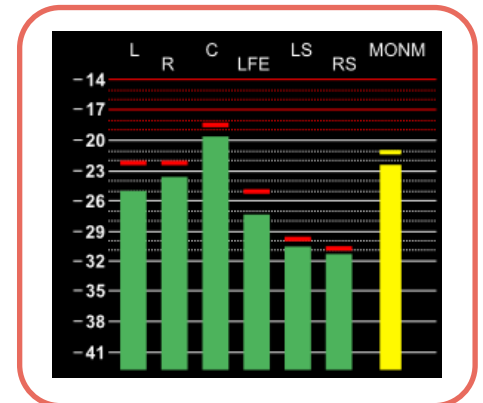

Eye Width

Range: 10% - 100%
All SDI capable PAM PICO TOUCH feature the Eye Width Parameter as default feature.
Inspired by cell phone reception indication, Eye Width expresses the immediate quality of the incoming SDI signal and allows you to constantly monitor this to avoid any drop outs and instabilities.

The background for the Eye width feature has its starting point in the data eye diagram, typically used to depict deviation in amplitude and timing of the incoming data stream. By folding the parts of the waveform corresponding to each individual bit into a single graph, the eye pattern represents an average statistic of the incoming data and the eye opening expresses the signal quality in terms of amplitude (level difference and timing difference (jitter).

Eye Width, as the name suggests, is concerned with the width of the eye pattern, focusing primarily on the timing differences which can also be measured as jitter. While not being an actual jitter measurement, Eye Width expresses the eye pattern max. timing window as a percentage of the ideal, where 100%
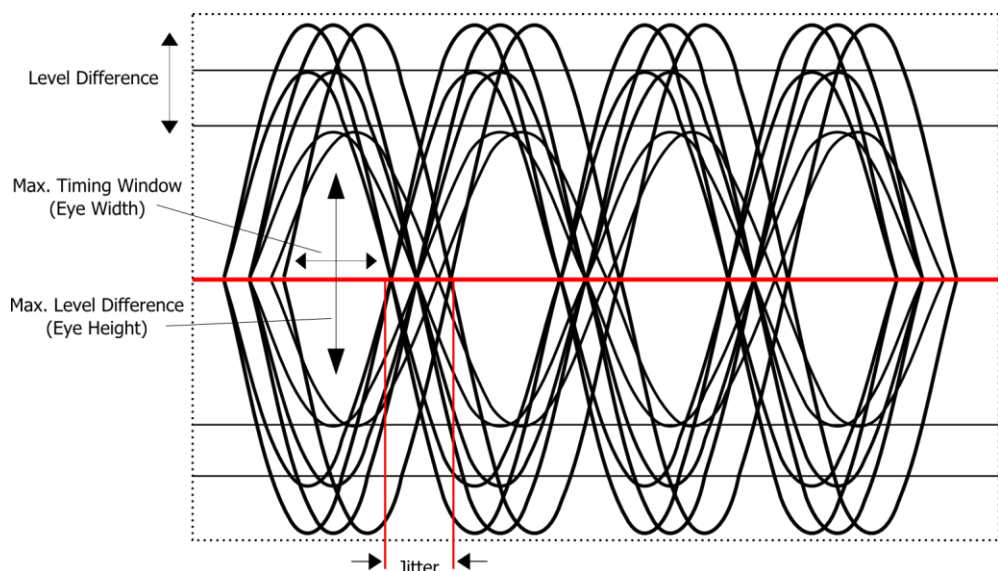
width is the theoretical optimal signal with no quality loss (90% is likely to be the max. in real life), and 10% width the worst case scenario where most products will be unable to the lock onto the signal.

AES Lock Indication

The AES enabled PAM PICO TOUCH feature an AES lock indicator, allowing you to instantly confirm that the meter is locked onto the incoming signal. When clocking to an incoming AES signal, AES1 needs to be fed the master clock. Given that a valid clock and lock is achieved, AES1 will light up green.
The corresponding AES inputs will be green when valid data is received in sync with the incoming clock on AES1.

Goniometer – Vectorscope

The Goniometer is automatically chosen when StarFish® or JellyFish® are enabled and only 2 channels are routed to the Bargraph section (please the Matrix section for further details).

The Goniometer or Vectorscope displays phase and amplitude information on the Left and Right input channels.

Phase correlation

When the Goniometer, StarFish® or JellyFish® are selected, the left most part of the display is a phase Bargraph with purple graticule lines. This displays information on the main left/right inputs, with the factory supplied default for this being the first AES input. Other signals can be chosen using the internal matrix.

Audio meters are rarely used to display pure sine waves and the term "in-phase" is applied here meaning a signal where the mono sum is equal to or greater than the higher of the left and right signals. "Out of phase" is a signal where the mono sum would be less than the higher of the left and right signals.

Signals which are predominantly "in phase" have a green marker in the upper half of the range. Fully correlated signals such as double mono read on the +1 mark. Signals which are "out of phase" are shown with a red marker in the lower half of the range.

With no input, with only the left or right driven or with correlated mono but with a 90 phase shift, the marker position is the halfway point with the upper section of the marker green and the lower part red.
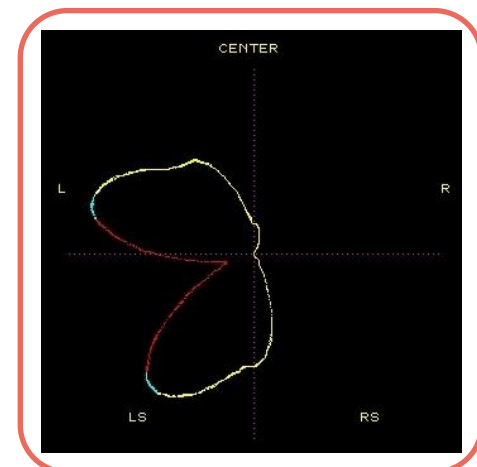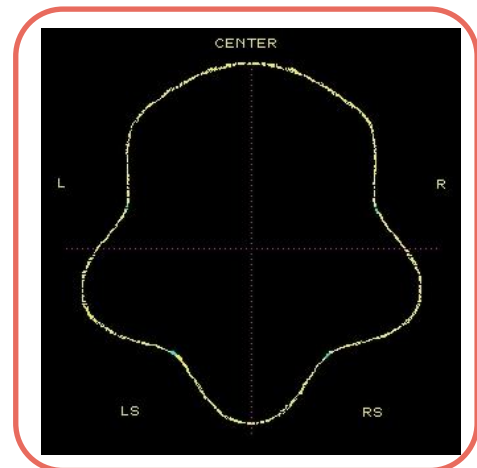
StarFish®

The StarFish® is the development in the JellyFish® surround audio display, developed by TSL Products many years ago. It provides a picture of a 5.1 surround audio field. The display has the front center channel arranged towards the top with other directions as marked.

The image here shows the StarFish® display with equal audio on all legs. Typical sound fields have energy in a variety of directions and more complex shapes are created which give an indication of the directions having significant amplitudes. Unlike the earlier JellyFish® display which with the same signal would have shown a circle, the

StarFish® takes into account the summation occurs when there is coherent (in-phase) content between legs such as left and centre. Polarity inverted (out of phase) signals can cause the shape to be pulled inwards towards the centre point, reflecting the perceived cancellation that occurs.

A yellow coloured trace indicates that there is a high degree of coherent signal content.

When the signals are largely un-correlated, the trace becomes blue.

When the predominant content is polarity inverted, a red section of trace shows highlights that might have produce a phasing problem. The randomness of typical surround signals means an occasional glimpse of red should not be a cause for concern, though red showing for extended periods should be investigated as it can be a sign of a signal that will not fold-down well into stereo and mono.

JellyFish™

DK Technologies' trademark 'JellyFish®' display was first launched on audio only meters. It was later developed to provide the alternative 'StarFish® display and both included in the PAM PiCo. Both modes provide a picture of the surround audio field in 5.1, 6.1 or 7.1 channel modes. The display has the front center channel arranged towards the top with other directions are marked.

The image here shows the StarFish® mode with equal audio on all legs. In JellyFish® mode, the same signals would produce a circular display. Typical sound fields have energy in a variety of directions and more complex shapes are created which give an indication of the directions having significant amplitudes.

Surround display size

The default setting places an audio compressor in the drive to the surround display. This provides a relatively consistent display size from which phase indications can easily be read, which is the primary purpose of the surround display, amplitude being read from the Bargraphs.

Loudness Bargraph(s)

The Loudness Bargraph enables your loudness readings to be monitored side-by-side with the regular amplitude Bargraphs.
The specific loudness parameter displayed on the Loudness Bargraph may be set in the Quick setup menu; Input and Channel order, or in the Advanced Menu; Meter Setup/Loudness Option.
In addition to the loudness reading, Start/Reset buttons for initiating and resetting the overall Loudness Capture are supplied as well. These are described in detail in the Loudness Setup - Capture section.

Meter Text Readouts

The four Meter Text Readouts allow for completely customized view of four parameters in addition the regular audio tools.
The custom setup of each of the four Readouts may be set in the Quick Setup menu; Window Text Read-out or the Advanced Menu; Meter Setup; Windows Text

Reclaim Factor

The Reclaim factor indicates how much you can increase your signal while still staying within your loudness target.
The Reclaim Factor is essentially the difference between the absolute gated loudness and the dynamic gated loudness.
By making sure that your material is always above the dynamic gate threshold, the reclaim factor ensures optimal loudness within the given standards.

Graphical Loudness

Loudness values can be shown graphically against time using the Graph LEQ function.
The Graphical Loudness display allows for up to 3 minutes of loudness to be mapped against time.
The Graphical Loudness view is reached by sliding once to the left of the basic Bar graph display (view 2 Portrait, View 3 Horizontal).

After hiding the Analyzer panel, the left panel part of the screen shows the individual audio level Bargraphs for the elements that make up the surround (or stereo) signal.

The Bargraph in the right panel shows the instantaneous loudness value.

The Loudness Capture functions are described in detail in the Capture section.

The 'Integtr'/'Shorttrm' button allows for toggling between the two different Loudness measures.

In addition to the graphical loudness, the Peak and Peak hold functions are also made available in the Graphical Loudness display.

The Peak button enables/disables the flying peak of the bar graphs across all meter views.

Similarly, the Hold button enables/disables the peak hold function across all meter views.

FFT Spectrum Analyzer

The FFT Spectrum analyser allows you an instant view of the spectral content of your source signal for detailed analysis and weighting of the different frequency areas.

Slide all the way to the left on your meter views to reach the FFT.

The FFT (Fast Fourier Transform) analyzer function performs a 1024 band audio spectrum analysis function.

The FFT features a 10x Zoom function, allowing a more precise view of the audio spectrum.

Furthermore, the FFT allows for pointing to a specific frequency pin for detailed readings, by using the 'Cursor' button.

Hit the 'Cursor' button and use the 'Move' buttons to point to the desired frequency pin.

Once the relevant frequency pin has been selected, the 'SetRel' function (Set Relative Level) allows you to align the overall FFT level using the current pin as the reference point.

Moving Coil Emulation

The PAM PiCo features Moving Coil emulation in two different modes replacing the standard Bargraph indication.

The Moving Coil emulation is enabled in the Advanced Setup menu; Meter Setup/Display mode.

The Moving Coil mode allows for up to four moving coils simultaneously. The StarFish/JellyFish®, Goniometer and Phase correlation may still be displayed in addition to Moving Coils.

The Dual mode allows a single moving coil arc to display two signals by using a dual Needle Concept.

The specific signals displayed depend on the signals routed in the Matrix Output Assign folder e.g. Left/Right or M/S.

Loudness & Terminology

About Loudness

Loudness measurements differ from conventional signal amplitude measurements in that they are also influenced by the frequency content of the signal and the duration of transient components. The way these various elements are handled to give a value for display has been defined by the International Telecommunications Union in their standard ITU BS1770 which is the only loudness standard to have achieve any degree of international acceptance.

The PAM PiCo allows a number of parameters to be adjusted to suit whatever options your organisation and perhaps regulatory body has decided to mandate.

Two organisations leading the way in the standardisation of loudness measurements are the Advanced Television Systems Committee (ATSC) in the USA and the European Broadcasting Union (EBU) in Europe. The background information to the measurement norms is contained in the ATSC document "Techniques for establishing and maintaining audio loudness for digital television", document A/85:2011. The EBU document R128 is supplemented by EBU Tech 3341, 3342, 3343 and 3344 between them they define a number of terms and set out the reasons behind many of the objectives of loudness measurements.

Terminology

The Loudness world includes a number of terms and abbreviations worth noting:

Loudness Range (LRA)
Loudness range is a statistic calculation of the material's dynamic range based on the short term (sliding) loudness (3 secs). Loudness Range is abbreviated 'LRA'.

Momentary Loudness (M)

Momentary loudness is the sum of the RLB weighted audio channels and integrated over 400ms. Momentary loudness is used to calculate short term and integrated loudness Momentary Loudness is abbreviated 'M'.

Short Term Loudness (S)

Short term loudness is a 3 seconds integration of the momentary loudness. (10 and 30 seconds are also used in some standards/regions). Short Term Loudness is abbreviated 'S'

Absolute Gated Integrated Loudness

The absolute integrated loudness is a long term measurement (an integration over the entire material) based on the momentary loudness. It uses an absolute gate at -70LUFS/LKFS (M) which means that if the momentary loudness is getting under -70LUFS/LKFS then the measurement holds until the momentary loudness goes above. The absolute loudness is not used directly by the user, but is used to calculate the dynamic gate. The dynamic gate is, according to ITU-R BS.1770-2, -10 LU below the absolute gated loudness.

Dynamic Gated Integrated Loudness (I)

The dynamic gated loudness is a long term measurement (an integration over the entire material) based on the momentary loudness.

It uses a dynamic gate at -10 LU under (dB relative to) the absolute gated loudness which means that the measurement is on hold if the momentary loudness gets under the dynamic gate.
It is always the last value of the dynamic gate which is used on the material. This means that it is necessary to include or exclude any material from the "past" if the dynamic gate is changing. This means that the dynamic gate is always -10 LU under (dB relative to) the end result of the dynamic gated loudness.
The dynamic gate level may vary with local requirements. Dynamic Gated Integrated Loudness is abbreviated 'I'

True Peak (TP)

True peak measurements, not only looks at the actual samples, but also inter-sample peaks.
This means that True Peak metering will indicate peaks that would potentially cause distortion when converter in e.g. digital-analogue converters, sample rate converters and data compression codecs.
True peak is therefore a highly relevant tool when performing normalization of source material.

LUFS, LKFS and LU

The three LU, LUFS and LKFS are essentially addressing the same issue, which sometimes cause some confusion.
LKFS is the K-weighted loudness scale and one unit on this scale is equal to one dB. LUFS is identical to LKFS. ITU-R BS.1770-2 and ATSC are using the terms LKFS, while EBU R128 are using LUFS – both are expressing the identical scale. 0 LUFS/LKFS is equal to 0 dBFS @ 1KHz according to ITU-R BS.1770-2 and EBU R128 (some recommendations may use 400Hz).

LU stands for Loudness Unit, and is a scale relative to the chosen Reference level. 0 LU is equal to the reference level. The reference level will vary between the different Recommendations e.g. EBU R128 has 0 LU = -23 LUFS. One LU is equal to one dB

Technical Specification

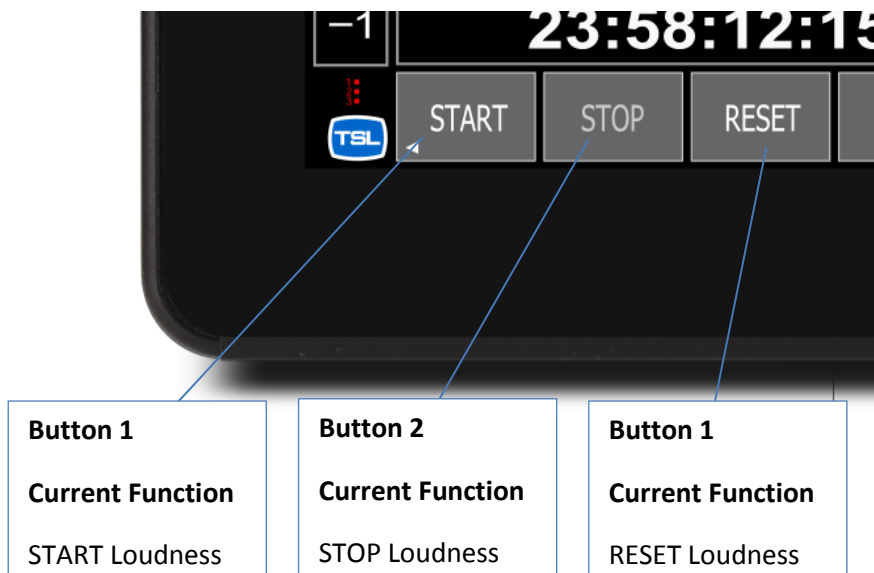## PAM PICO TOUCH Hardware GPIO – External Hardware Control

PAM PICO TOUCH features three hardware GPIO's using pin 5 and 13 on the 15 pin Sub-D connector. It allows for up to **three external hardware control functions** to be remote controlled through shorting to ground (pin 11).

The following GPIO position triggers their respective On-screen button functions:

GPIO	Button 1 – Function 1	Button 2 – Function 2	Button 3 – Function 3
GPIO 0	High	Low	High
GPIO 1	Low	High	High

The three GPIO functions corresponds to the three leftmost horizontal on-screen buttons.

The specific function of these (and any other) on-screen button, may be determined completely freely by the end-user.

Button 1	Button 2	Button 1
Current Function	**Current Function**	**Current Function**
START Loudness	STOP Loudness	RESET Loudness

D-Sub Cable Pin-out

Here is the pinout of the 15 pin D-Sub connector on the backside of the PAM PICO TOUCH.
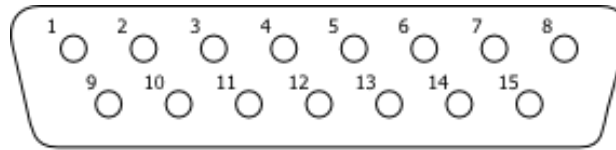
1: USB GND   9: VBus (USB 5V)
2: D+ USB   10: D- USB
3: Supply 15V   11: Pwr GND
4: HP Left   12: HP Right
5: GPIO 0   13: GPIO 1
6: Ana 1+   14: Ana 1 -
7: Ana GND   15: Ana 2 -
8: Ana 2+

Mechanical Dimensions and Mounting

107 mm   214 mm   132 mm   PT0T7

186 mm   24 mm   132 mm   DK T7

88 mm   18 mm   132 mm

Mechanical	PiCo 1, PiCo 2	PiCo 5	PAM PICO TOUCH
Dimensions	88 x 132 x 18 mm Aluminium Chassis	88 x 132 x 18 mm Aluminium Chassis	132 x 186 x 24 mm Aluminium Chassis
19" Rack mountable	Yes	Yes	Yes, PAM PICO TOUCH / R variant
Desk Top Bracket	Included	Included	Included

PAM PICO TOUCH Backplane Connections

PAM PiCo Touch I/O
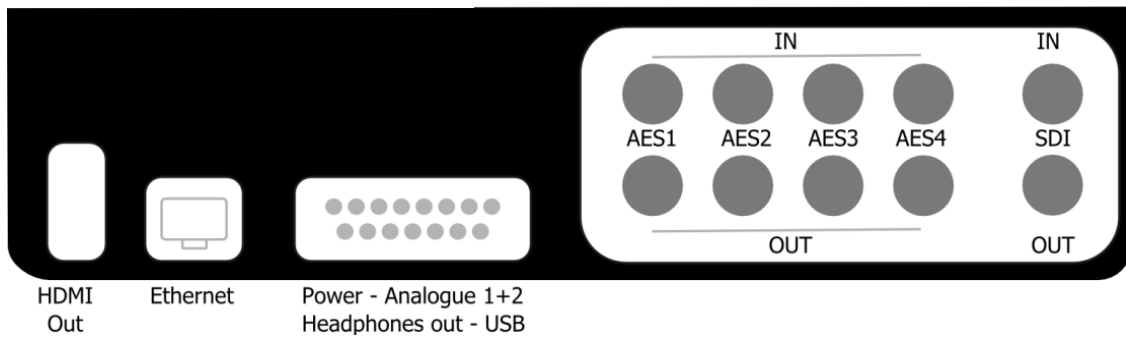
PAM PICO TOUCH Tools Overview

	PiCo1 /PiCo2	PiCo5	PAM PICO TOUCH
Tools Included			
Peak Metering	Bargraph, Moving Coil Emulation, Numerical	Bargraph, Moving Coil Emulation, Numerical	Bargraph, Moving Coil Emulation, Numerical
Loudness Metering	Bargraph, Moving Coil Emulation, Numerical, Historical	Bargraph, Moving Coil Emulation, Numerical, Historical	Bargraph, Moving Coil Emulation, Numerical, Historical
Logging Loudness & True Peak	Yes, Log to ext. database	Yes, Log to ext. database	Yes, Log to ext. database
Spectrum Analysis FFT	Yes, 1024 band	Yes, 1024 band	Yes, 1024 band
SMPTE Timecode reading	Readout + Logging	Readout + Logging	Readout + Logging
Vector Scope Surround	StarFish / JellyFish (PiCo 2)	StarFish / JellyFish	StarFish / JellyFish
Gonio Meter Stereo	Yes	Yes	Yes
Phase Correlation	Yes	Yes	Yes
Picture Preview	No	Yes, SD / HD / 3G	Yes, SD / HD / 3G
Eye Width SDI Quality	No	Yes	Yes
PiCo Matrix PC Editor	Yes	Yes	Yes
Screen Grabber	Yes	Yes	Yes

Technical Specifications	PiCo1 / PiCo2	PiCo5	PAM PICO TOUCH
Audio Connectors			
Analogue input	2 XLR input	2 XLR input	2 XLR input
AES input	6. ch. AES3 Inputs BNC (AES3-4-2009)	6. ch. AES3 Inputs BNC (AES3-4-2009)	8. ch. AES3 Balanced 110ohm/Unbalanced 75ohm
AES output	-	-	8 ch. AES3 Unbalanced (75ohm)
Headphone out	No	No	Yes
Video Connectors			
SDI In / Out	-	BNC 3G/HD/SD SDI (active loop through)	BNC 3G/HD/SD SDI (active loop through)
Digital Input			
Bit Resolution	24 bit	24 bit	24 bit
Group Delay	1.75msec	1.75msec	1.75msec
Nominal input imp.	75 ohm	75 ohm	75 ohm
S-rate int. /ext.	48kHz – no SRC	48kHz – no SRC	48kHz – no SRC
Analogue Input			
Input type	Balanced (electronic)	Balanced (electronic)	Balanced (electronic)
Dynamic range	>103dB	>103dB	>103dB
SNR	Typ. 93dB rel. -1dBFS	Typ. 93dB rel. -1dBFS	Typ. 93dB rel. -1dBFS
Maximum input level	24dBu	24dBu	24dBu
Control Interface			
Computer Interface	USB	USB	USB, Ethernet
GPIO	No	No	Yes, hardware + soft
Screen & Operation			
TFT	4.3"	4.3"	7"
Operation	Touch Buttons	Touch Buttons	Multi Touch Screen
Screen Output	No	No	HDMI 1024 x 600
Number of Display ch.	PiCO1: 4, PiCo2: 8	16	16
Loudness			
Compliant with...	ITU BS1770-3, EBU R128, A/85, ARIB	ITU BS1770-3, EBU R128, A/85, ARIB	ITU BS1770-3, EBU R128, A/85, ARIB
Reference Level digital	-12dBFS & -24dBFS	-12dBFS & -24dBFS	-12dBFS & -24dBFS
Dynamic gate level	-2LU dB to -20LU/Off	-2LU dB to -20LU/Off	-2LU dB to -20LU/Off
Momt./Short trm/Sliding	0,4 – 3 – 10 - 30 sec.	0,4 – 3 – 10 - 30 sec.	0,4 – 3 – 10 - 30 sec.
Numerical Readouts	Intgr. Momnt, Shorttrm, LRA, True Peak, Reclaim Factor	Intgr. Momnt, Shorttrm, LRA, True Peak, Reclaim Factor	Intgr. Momnt, Shorttrm, LRA, True Peak, Reclaim Factor
True Peak	Flying peak & Num.	Flying peak & Num.	Flying peak & Num.
Peak thrs. / hold time	-2dBFS / >0.5sec	-2dBFS / >0.5sec	-2dBFS / >0.5sec
Power			
Consumption	1.7W	2.5W	10W
Power Supply	Plugtop, 100-240V, 5VDC, 500mA	Plugtop, 100-240V, 5VDC, 500mA	Plugtop, 100-240V, 15VDC, 1500mA