

Limpet is a signal processing and networked control and monitoring module intended for installation in an active loudspeaker, making an ideal companion for Linea's MiniPod amplifiers. Processing includes crossover filtering, equalisation, delay and limiting, in addition to comprehensive monitoring features. Exceptional sonic quality is assured by careful selection of critical components, minimum signal path and expert DSP algorithm design. Limpet's small dimensions allow it to be tucked away in a restricted space.

Introduction / Key Features

Primarily targeted at active loudspeakers, Limpet is an ideal companion for Linea Research's analog pod amplifiers, adding Digital Signal Processing and BvNET networked setup, monitoring and control.

Housed in a compact, rugged steel case, Limpet provides generous amounts of signal processing capability, with access to a wide variety of crossover shapes.

A simple user-interface may consist of some essential indicators and a switch arrangement which allows the user to select from a number of Voicings which you provide.

A multi-km network of devices may be monitored and controlled by the PodWare Windows application. Protection of your settings is assured in an uncomplicated fashion by cleanly separating your OEM settings from those which the user has access to.



Sonic Purity

Limpet uses 96kHz sampling rate, Burr-Brown analogue-to-digital converter, the renowned Wolfson multi-bit digital-to-analogue converter, and a powerful 3rd generation Sharc Digital signal Processor (DSP) running audio processing algorithms borne of years of experience in high quality professional digital audio. All this adds up to deliver the ultimate in sonic transparency and a stunning open natural sound quality, fully living up to the very high sonic standards set in our amplifier products.

Branding

Each device is branded for the OEM customer so that PodWare reports the model name of your choice, with your colour scheme etc.

Crossover shapes

Limpet is capable of crossovers up to 8th order (48dB/Octave). In addition to the usual Butterworth, Linkwitz-Riley and Bessel filter shapes, Limpet provides access to Hardman crossover filtering, a technique we are proud to have introduced to the industry. Hardman filters produce much steeper cut-off slopes for a given order than conventional crossover alignments, without any additional group delay. This allows a lower order filter to be used without sacrificing cut-off characteristics, but with smoother group delay and less severe phase penalties, giving a more natural sound. Hardman filters also provide identical phase characteristics between adjacent bands (like Linkwitz-Riley), so the polar performance is rock steady.

We also employ phase matching on our Bessel filters, so adjacent bands are in-phase throughout the crossover region.

Our white-paper "Crossover Filter Shape Comparisons" provides more detail on this subject.

High-Pass Filtering

To avoid unnecessary inter-band phase shifts common in many competing products, we provide high-pass filtering on the inputs rather than forcing you to apply 'system' high-pass filtering on the low crossover bands.

Our white-paper "High-Pass Filtering in Two-Way Systems" explains why this is important.

Configuration

Limpet may be configured to provide processing for up to 2 audio inputs and up to two audio outputs.

- Two independent channels
- High quality 96kHz audio processing
- Separate OEM and User settings
- Temperature monitoring
- Driver impedance monitoring
- Abuse logging
- BvNET networking

The number of channels shown in PodWare is determined by the firmware model issued by Linea Research.

Voices

Limpet allows four complete sets of parameters to be stored. Each set is

called a *Voice*. Voices may be used, for example, to select an alternative tuning as may be required if a speaker is used with or without a separate sub-bass unit. Voice settings are stored permanently inside Limpet and so will always be available even if Limpet is not being used with PodWare.

The voice selected depends on the condition of two 'switch' lines. Normally two latching switches would be used to determine which voice is selected. If no connections are made to either of the two voice select terminals, voice 1 will always be activated at power-on.

Indicators and Switches

Up to two LED indicators and up to two Switches may be used on your loudspeaker and wired into Limpet. The LEDs can be configured to show a range of things such as Signal Presence and Limiter action. The switches would normally be used to select Factory/User Voice and Factory A/Factory B Voice.

Temperature Sensing

Limpet contains a temperature sensor internally, which is always shown on the PodWare panel.

Up to two further external temperature sensors may be attached. Your OEM settings will determine whether each of these sensors is enabled. If any external sensor is enabled, a temperature bargraph and a temperature log will be displayed for that sensor in PodWare.

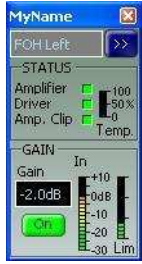
Impedance Monitoring

Up to two external current transformers may be attached which can monitor the impedance of the connected driver(s).

PodWare is then able to check that the driver impedance is within the limits determined by your OEM settings.

PodWare's MonIcon

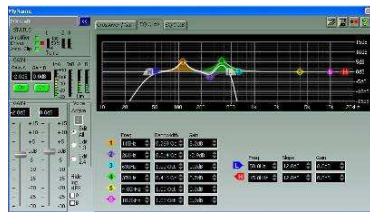
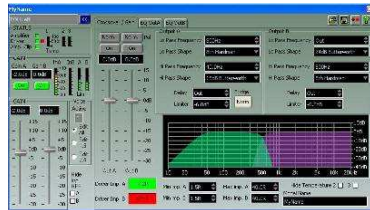
The PodWare application uses a small panel called a *MonIcon* to display all the important status information about Limpet at a glance. From this small panel it is possible to see input signal activity, limiter activity, temperatures, amplifier protection status, driver impedance status and amplifier clip indication, as well as being able to change the gain and mute the loudspeaker. The full control panel is only one click away from the MonIcon. You can also update the firmware in the unit via PodWare – even via the network.



OEM Settings

As the OEM, you have complete freedom to edit the crossover, driver equalisation and driver delay parameters. You can also apply a model name for the loudspeaker. Once a complete tuning has been completed, PodWare allows you to save a Factory file which contains all these parameters. This file can then be used to load settings in production. Should you wish to change the OEM settings in the field, modified Factory files can be distributed and loaded by the user without disturbing the user-settings, and without the user being able to access the OEM settings.

In OEM mode, the full Limpet control panel in PodWare looks like this:



Hiding

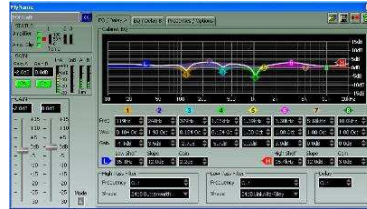
By having a clean split between OEM and User processing, security is very simple: The user cannot access any of the parameters which are considered to be the responsibility of the OEM. Only with the OEM password (agreed with Linea Research) can PodWare be unlocked to gain access to the OEM parameters.

However, the OEM can optionally hide the input High-Pass filters from the user in situations where these are required by the OEM for integrating the loudspeaker with a separate Sub-woofer.

User settings

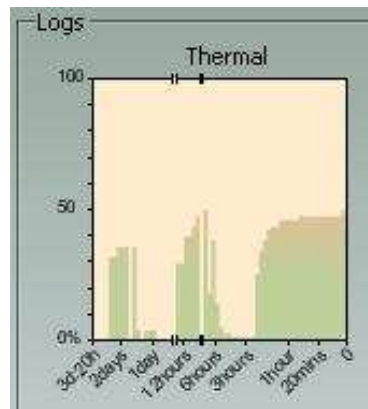
The user cannot access your driver (output) settings since these are only accessible in OEM mode, which is password protected. The user can however apply input processing, which will effectively overlay your OEM settings.

In normal User mode, the full Limpet control panel in PodWare looks like this:



Abuse Monitoring

Limpet continuously records logs against time for all the temperature readings, and the state of amplifier protection for up to 3 days into the past. These may be easily viewed at any time. The data from them can even be exported to a spreadsheet for further analysis.



Availability of Features

Depending on whether PodWare is in OEM mode or User mode, the 'parameters' which may be viewed (and if appropriate, edited) are as follows:

Parameter	Available	
	OEM	User
Input gain	✓	✓
Input High-Pass filter	✓	✓
Input Low-Pass filter	✓	✓
8 band Input		✓
2-band Input shelving		✓
Input Delay		✓
Output Gain	✓	
Output High-Pass	✓	
Output Low-Pass Filter	✓	
6 band Output	✓	
2 band Output	✓	
Output Delay	✓	
Output Limiter	✓	
Input level meter	✓	✓
Limiter meters	✓	✓
Amplifier protect	✓	✓
Temperature meter(s)	✓	✓
Driver imp.indicator(s)	✓	✓
Amplifier clip indicator	✓	✓
Abuse logging	✓	
Power cycle count	✓	✓

Obcom

An all-new, clean messaging system developed by Linea Research, called Obcom is at the heart of our software. Obcom is used throughout our application software, and across all communications media (such as BvNET). It is a thoroughly uniform standard that allows easy communication between different applications and different devices that support the Obcom standard. Obcom now has a large user base and is supported by many Pro Audio manufacturers.

Connections

There are eight multi-way connectors on Limpet, suitable for connection to:

- The Channel A amplifier (audio output etc).
- The Channel B amplifier.
- The 'interface panel' (audio input A and indicators, switches etc).
- The channel B audio Input
- External temperature sensor A
- External temperature sensor B
- External current sensor A
- External current sensor B

Linea Research can supply 'standard' wiring looms and interface circuit board assemblies. We would also be pleased to assist with the design of any custom wiring looms, and would be pleased to offer a quotation to supply such looms or completely wired panels

Technical Specifications

Input impedance: 5.5k Ohm unbalanced
11k balanced

Output Imp: <50R Gnd balanced

Max Input level: +10dBu

Max Output level: +5.5dBu

Sample rate: 96kHz

Frequency Resp: 20Hz - 20kHz +/- 0.5dB
10Hz - 40kHz +/- 1dB

Dynamic range : 110dB A
(20Hz - 20kHz)

THD (20Hz-20kHz): <0.01%

Power consumption: 4W max.

Environmental

Temperature: 0 to +55°C
Humidity: 0 to 80% RH
(non-condensing)

Dimensions

Height: 24mm
Width: 83mm
Depth: 138mm
Weight: 300g

Regulatory compliance

This product complies with the EMC Directive (89/336/EEC) as issued by the Commission of the European Community. Compliance

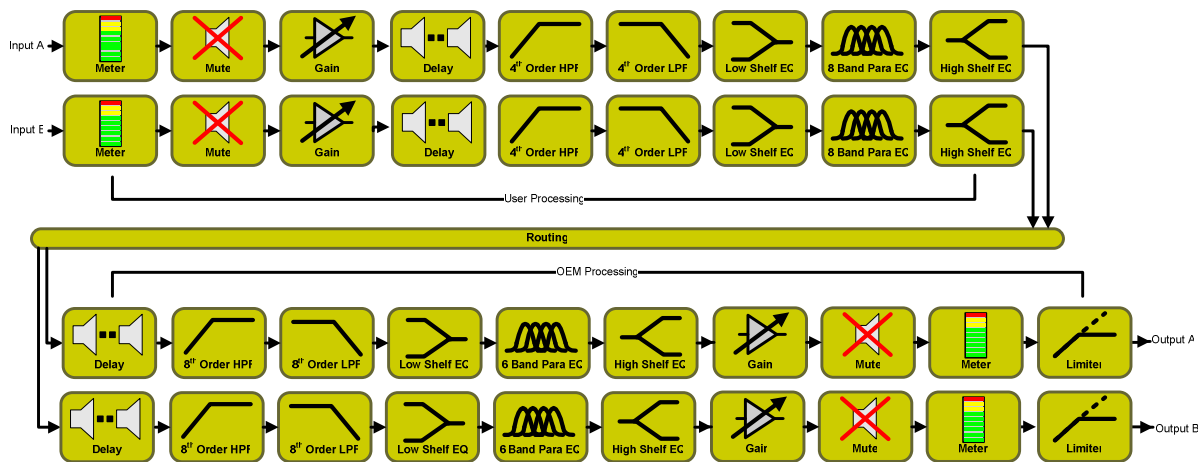
with these directives implies conformity with the following European standards:

- EN55103-1 Electromagnetic Interference (Emission)
- EN55103-2 Electromagnetic Susceptibility (Immunity)

It also meets the requirements of part 15B (EMC).

This product is intended for operation in the E2 (commercial & light industrial) and E3 (urban outdoors) Electromagnetic Environments.
E&OE

Signal Processing Block Diagram



Dimensional Drawing

