

- ACOUSTIC FEEDBACK SUPPRESSOR BASED ON UNIQUE PATENTED ALGORITHM •
- BUILT-IN AUTOMATIC EQUALIZER •
- SELECTABLE LIMITER •
- POWERFUL 24-BIT DIGITAL PROCESSING •
- BOTH ELECTRONICALLY AND TRANSFORMER BALANCED INPUTS AND OUTPUTS •
- INPUT AND OUTPUT LEVEL ADJUSTMENT •
- EASY USER CONTROL WITH BACK-LIT LCD •
- SOFTWARE UPGRADEABLE ARCHITECTURE VIA STANDARD RS232 INTERFACE •
- 48V BACK-UP POWER SUPPLY INPUT •

Profecta - The hardware

The Profecta is a digital signal processor frame for professional audio applications. Its powerful 80 MIPS DSP with 24-bit internal processing and 20-bit ADC's and DAC's with programmable gain amplifiers give a wide dynamic range at all practical audio levels.

The unit comes in a 19" housing (1U) for easy rack-mounting and has a front lid to cover all user controls to avoid accidental setting changes.

A universal input Switched Mode Power Supply with 48V DC backup input allows for simple installations all over the world and for uninterrupted use in e.g. EVAC-applications. In case the unit is switched off, the inputs are directly connected to the outputs (bypass-mode).

The Profecta is equipped with an analog input/output module with two inputs and two outputs on 3-pin XLR connectors. In either case one of them is transformer balanced, the other is electronically balanced. The user can select between these.

An RS232 interface facilitates future software upgrades.

AFS - The solution to avoid acoustical feedback

The performance of any sound reinforcement system is limited by physical and acoustical factors. Acoustical feedback occurs when the 'loop gain' of certain frequencies of amplified sound exceeds one. This is when sound from the loudspeakers arriving at the microphone is louder than the sound of the source arriving at the microphone. The sound of the loudspeakers is picked up by the microphone and amplified again. This cycle continues until the system's maximum output level has been reached. Reducing the gain of the sound reinforcement system will stop the howling or the ringing (i.e. audible echo tails if the feedback stability margin of the system is too low) occurring. But this limits the volume, and therefore the speech intelligibility. Some feedback suppression systems use a frequency shift technique that offers some limited relief, but also have

some undesirable audible artifacts, like a repeating echo that spirals upwards or downwards in frequency. Others use automatic signal equalisation with notch filters that gives a little bit more improvement in gain, but although these systems often use dynamic filters, the filters are reactive (which means the feedback is briefly heard) and they also change the frequency response. Philips AFS (Acoustic Feedback Processor, a piece of DSP software running on the Profecta), which uses a unique patented combination of echo cancellation and frequency shift technology, does not have these limitations and can even offer an amazing gain increase of up to 20dB, depending on the application.

A digital adaptive FIR filter cancels the sound coming from the loudspeakers that reach the microphone. The frequency shifter decorrelates the original input signal, to



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avoid that this wanted signal will be cancelled also. But the normal frequency shifting spiral artefacts are again cancelled by the adaptive filter. This really is a very powerful combination.

For (almost) all situations

Three different AFS modes are selectable:

- Direct coupling for use in smaller rooms, where the sound from a loudspeaker reaching the microphone is mostly direct. The echo tails are short and the acoustic paths can change relatively fast (e.g. by microphone movement). The adaptive filter is therefore short and fast.
- Stage support for use in large halls, where the sound from the loudspeakers reaching the active microphone(s) is mostly reverberant. The echo tails can be long and the acoustic paths are relatively stable. The adaptive filter is therefore long and accordingly slow.
- Universal mode for situations in between these above.

The adaptive filter only acts in the frequency band where howling normally occurs. Frequencies above that band are bypassed, time aligned, and added to the filtered output. Normally, these higher frequencies are attenuated enough by atmospheric absorption and will not give rise to howling. Only for some small rooms additional high frequency attenuation could be desired, and this can be adjusted via the user interface.

Because the algorithm uses frequency shifting for decorrelation of the input signal, AFS is best suited for speech applications, where this small frequency shift is normally not audible. For music this algorithm is less suited.

Easy to use and install

Philips Profecta/AFS is a powerful system to overcome the most difficult acoustic conditions in congress centres, assembly halls, theaters and places of worship, where its main application is in speech reinforcement. It is simply inserted into any sound reinforcement system between the pre-amplifier and the power amplifier stages. Setup is easy and direct, using a menu driven user interface with display.

Apart from AFS, the unit also provides a unique equalizer (switchable) that adjusts automatically and continuously on the original input signal compared to the sound received from the loudspeakers, without requiring a pink noise signal for setup. A limiter is available to prevent the sound system from overloading by e.g. microphone abuse.

With Profecta/AFS, you get the best from your sound reinforcement system, and your audience gets to hear the message the way that it's supposed to be heard.

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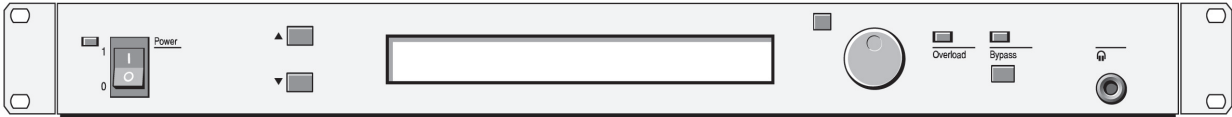


Figure 1 - Profecta Front Panel

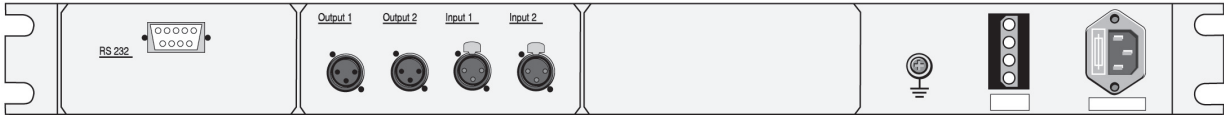


Figure 2 - Profecta Rear Panel

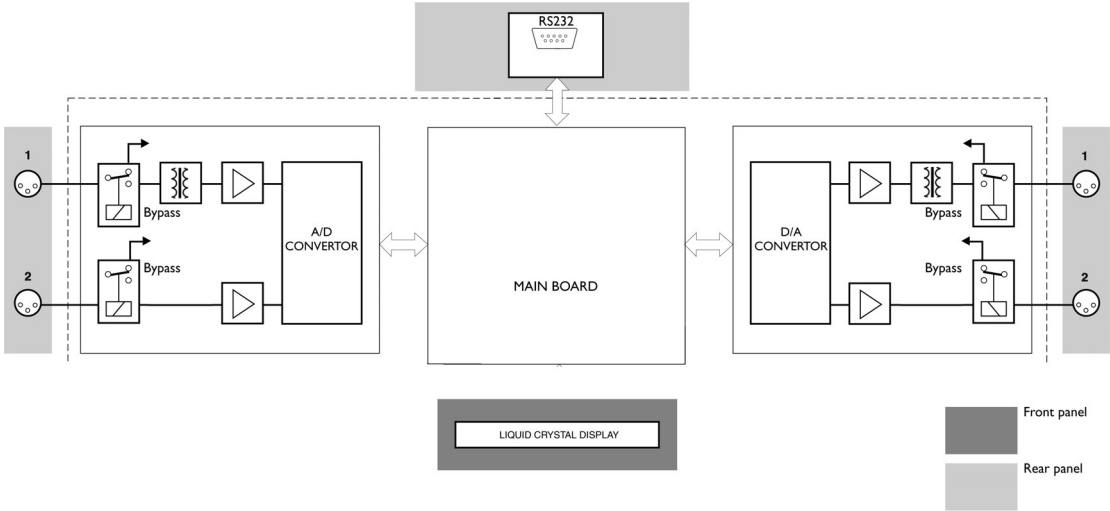


Figure 3 - Profecta Block Diagram

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LBB 4003/00

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Profecta/AFS – LBB 4003/00

Audio

Analog input 1	: XLR3 female, transformer balanced
Analog input 2	: XLR3 female, electronically balanced
Max. input level control range	: -20dBV ... +22dBV (1dB steps)
Input impedance	: >10kOhm
Analog output 1	: XLR3 male, transformer balanced
Analog output 2	: XLR3 male, electronically balanced
Max. output level control range	: -20dBV ... +22dBV (1dB steps)
Output impedance	: <50Ohm
Min. load impedance	: 600Ohm
Headphone socket	: Jack, 6.3mm
Headphone output	: +10dBV via 68Ohm

Processing

DSP	: Motorola 56303 (24-bit)
Storage of settings	: Non-volatile
Sampling frequency	: 32kHz
AD conversion	: 20-bit, 128 times oversampling
DA conversion	: 20-bit, 128 times oversampling

Performance

THD	: <0.01% @ 1kHz, 0dBV
Frequency response	: 125Hz – 15kHz, +0dB, -1dB
Dynamic range	: 100dB @ 1kHz, 0dBV (rms unweighted)

Acoustic Feedback Suppression

Adaptive filter length	: 1024 taps, 64ms (direct mode), 4096 taps, 384ms (stage mode), 4096 taps, 256ms (universal mode)
Adaptive filter bandwidth	: 7.26kHz (fs=32kHz/2, direct mode) 4.72kHz (fs=32kHz/3, stage mode) 7.26kHz (fs=32kHz/2, universal mode)
High frequency bypass gain	: 0 ... -70dB (1dB steps)
High frequency bypass frequency range	: 7.26kHz ... 15kHz (direct mode) 4.72kHz ... 15kHz (stage mode) 7.26kHz ... 15kHz (universal mode)
Frequency shift	: 5Hz upwards
Delay	: 7.0ms (direct and universal mode) 7.4ms (stage mode)
AFS gain	: -20dB ... +20dB (1dB steps)

Equalizer

Bands : 8 (automatic, off)

Limiter

Threshold : max. processing level (automatic, off)

Control

Display : 2x40 characters, back-lit LCD

Password protection : 4 digit

Number of stored parameter sets : 5

Communication

Data interface : RS232

Max. baud rate : 38.4kbaud

Power supply

Power requirement : 90-250VAC, 50-60Hz (universal input)

Power consumption : 20W max.

Back-up power supply : 40-56VDC via 4-pole ITT Canon

Physical properties

Weight : 6kg

Dimensions : 483mm x 323mm x 44mm (19", 1U)

Environmental

Emission : EN55103-1, FCC part 15

Immunity : EN55103-2

Safety : EN60065, UL6500

Temperature (operating) : +5 °C ... 55 °C

Quality

Production : ISO9001

MTBF : 100,000hrs at 25 °C normal working



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