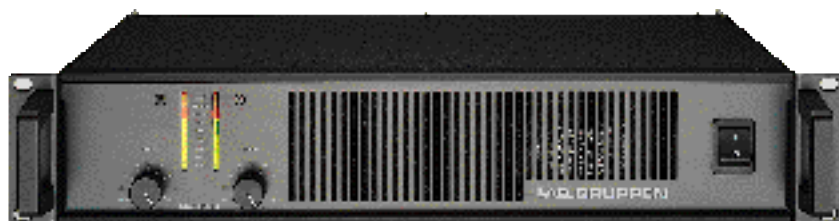




## LAB 300

Power specifications: stereo  
EIA at 1 kHz and 1% THD

- |  |        |        |        |
|--|--------|--------|--------|
|  | 8 ohms | 4 ohms | 2 ohms |
|  | 100 W  | 150 W  | 160 W  |
- ◆ Cooling: Conventional (no fan)
  - ◆ Protection; Short circuit, DC, high temperature, turn on, VHF and clip limiters
  - ◆ Dimensions in mm (inch); 483 (19")W × 44 (1.75")H × 280 (11")D
  - ◆ Weight; 7.5 kg (17 lbs)



## LAB 500

Power specifications: stereo  
EIA at 1 kHz and 1% THD

- |  |        |        |        |
|--|--------|--------|--------|
|  | 8 ohms | 4 ohms | 2 ohms |
|  | 180 W  | 290 W  | 320 W  |
- ◆ Cooling: One proportional speed fan
  - ◆ Protection; Short circuit, DC, high temperature, VHF and clip limiters
  - ◆ THX version; LAB 500T
  - ◆ Dimensions in mm (inch); 483 (19")W × 88 (3.5")H × 265 (10.5")D
  - ◆ Weight; 11 kg (24 lbs)



## LAB 1000

Power specifications: stereo  
EIA at 1 kHz and 1% THD

- |  |        |        |        |
|--|--------|--------|--------|
|  | 8 ohms | 4 ohms | 2 ohms |
|  | 380 W  | 600 W  | 700 W  |
- ◆ Cooling: Two proportional speed fans
  - ◆ Protection; Short circuit, DC, high temperature, VHF and clip limiters
  - ◆ THX version; LAB 1000T
  - ◆ Dimensions in mm (inch); 483 (19")W × 88 (3.5")H × 355 (14")D
  - ◆ Weight; 18 kg (40 lbs)



## LAB 1200C

Power specifications: 4 channel  
EIA at 1 kHz and 1% THD

- |  |     |        |        |
|--|-----|--------|--------|
|  | MLS | 8 ohms | 4 ohms |
|  | 8   | 370 W  | 650 W* |
|  | 4   | 200 W  | 380 W  |
- ◆ Cooling: Two proportional speed fans
  - ◆ Protection; ALS™ short circuit protection, DC, high temperature, turn on, VHF, over and under voltage and clip limiters
  - ◆ Dimensions in mm (inch); 483 (19")W × 88 (3.5")H × 335 (13.2")D
  - ◆ Weight; 8.7 kg (19 lbs)

## Lab.gruppen

– the company and the products  
Lab.gruppen currently produce eight power amplifier models of which five utilize switch mode power supplies (SMPS) and three utilize conventional power supplies. These models range from 2×150 W to 2×2400 W.

Whilst many competitors strive to produce as many models as possible it should be noted that since 1987 none of our SMPS products have been “discontinued”. Products are often improved allowing existing users to upgrade in many cases.

An area of pride is safety compatibility – all of the products meet the European safety approval IEC-65, and the switch mode products meet the European EMC rules. During the first quarter of 1995 most products were CE approved.

For installations in cinemas there are two variants, which are THX approved.

## Cooling system

Lab.Gruppen fan cooled amplifiers utilize a special copper cooling system called Intercooler® (copper conducts heat twice as good as aluminium).

Output devices (always bi-polar) are mounted directly on a compact heat-sink that produces turbulent airflow for maximum heat dissipation. The airflow in front of the heatsink is maintained by a pressure chamber and two proportional speed fans. A major advantage of the Intercooler® is that there are only a few degrees difference between all the devices. Compare this to a conventional cooling tunnel where there can be variances of up to 40 degrees between devices. With such a difference, matching complementary devices makes no sense!



Efficient cooling system with turbulent air flow.

Lab.Gruppen force cooled amplifiers have front to rear cooling. The main reason for this is because there is usually cooler air outside the rack than inside or behind (usually a closed rack with minimal venting because of cables).

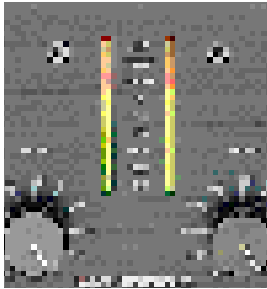
# LAB.GRUPPEN POWER AMPLIFIERS

Lab.Gruppen was founded in 1979, and have since then been designing and manufacturing power amplifiers and active crossovers/ speaker processors, utilizing ground breaking technologies. Apart from high reliability and excellent sound quality, the power amplifiers are characterized by good power to weight ratio and size. The crossovers and speaker processors are noted for good value for money as well as total flexibility.

It is however, the switch mode power amplifiers that have made Lab.Gruppen world leaders in this field since 1987.

Lab.Gruppen products are currently exported to more than twenty countries including the Americas, Africa and Asia.

**Protection circuits**  
Lab.Guppen power amplifiers have many advanced protection features that will protect both power amplifier and speakers connected to it, should a fault condition arise. Under normal use these features are inaudible and all protection circuits are independent.



## ◆ DC protection

There are two types of DC protection; Fuses on the supply branches of each channel (this is an IEC 65 requirement), and a Crowbar protection that shorts the output.

## ◆ Thermal protection

Protects the amplifier from overheating and causing damage to the output stages. Indicators come on before the signal is muted.

## ◆ Short circuit protection

Protects the amplifier by limiting the power being driven into the short circuit. Some amplifiers are equipped with Lab.Gruppen's Adaptive Limiting system (ALS™), which holds the output devices in their safe operating areas yet permits high peak currents.

## ◆ Clip limit protection

All amplifiers are equipped with clip limiters, which can be enabled via the amplifiers' rear panels. They are not simple DC detectors, but actually maintain a maximum distortion of 1% reaching the loudspeakers. As a by-product, when the amplifier comes out of a protect condition, the output level has a slow rise time. The effect is like turning the gain up slowly.

## ◆ VHF protection

Protects the loudspeaker against non-musical signals, outside the audible area. This protection is not a simple R.F. filter, as found in other designs.

## Switch mode amplifiers

Apart from excellent sound quality, the switch mode amplifiers possess high power to weight ratio (480 W/kg in the case of the LAB 4000 – the best in any class), and a regulated power supply.

This product line consists of the LAB 4000, LAB 2002, LAB 1600, LAB 1300C and the LAB 1200C.

The LAB 1200C is a four channel amplifier, which can be configured in a variety of ways, anything from  $4 \times 350$  W to  $2 \times 600$  W, at eight ohms!

The LAB 2002 and the LAB 4000 utilizes a switch mode output stage, which makes it three times more efficient than a conventional class AB amplifier.



Transformer core made of ferrite, used in the Lab.gruppen switch mode amplifiers, compared with conventional transformer made with iron core.

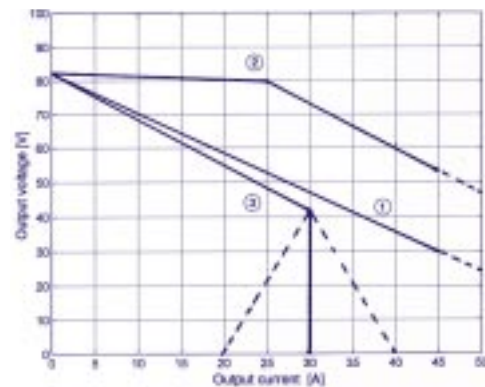
## Switch mode power supply (SMPS)

Switch mode power supplies are the modern solution to the problems of size and weight. However, early examples of SMPS used in power amplification were not ground breaking, and literally adopted the type of supply found in many computers today.

The Lab.Gruppen SMPS is different in that it is regulated. How is this achieved? In contrast to other designs, that use push pull converters, we have managed to produce a SMPS that has

the same characteristics as a conventional supply. We have avoided the pitfalls of push-pull converters, by eliminating the need for limiting on the secondary side of the switch trans-

former. This is achieved by using sense windings, injecting a magnetic pulse from the AC-line during a pulse time segment, which is separated from the output charge current pulse.



Current voltage characteristic of different power supply topologies.

- 1) Conventional power supply show voltage drop due to internal resistance
- 2) Regulated power supply used by Lab.gruppen
- 3) Unregulated switch mode power supply with current limiting.

Whilst the SMPS may sound complex it is actually very straight forward with high reliability. The net result is good bass and fast response.

Because the supply is regulated, the power amplifier will produce the same power output even if the AC line falls by more than 20% !



Upper curve shows the LAB 2002 power bandwidth in 4 ohms. US made conventional unit below.

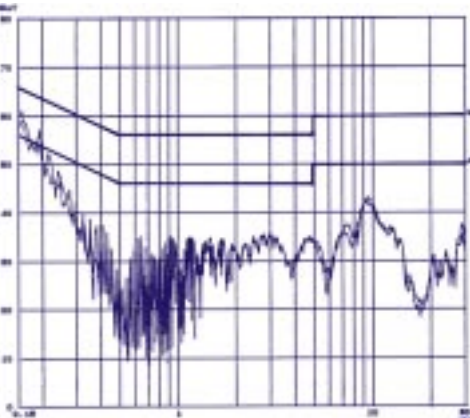


Efficiency is also assured, and in the case of the LAB 2002 and the LAB 4000, this is especially apparent; its power supply draws only 4 kW and yet it produces  $2 \times 1400$  W. (In a conventional amplifier this would yield only  $2 \times 650$  W – nearly 3 kW are wasted as heat).

Another feature is that the storage medium for the energy is the transformer core. In all other topologies smoothing capacitors are used on the primary side of the switch transformer with limited life as a result.

**Minimum Load Switches (MLS™)**  
Thanks to the regulated SMPS, the maximum power available for the output stages can be adjusted without increased heat dissipation or efficiency loss. This allows users to match the output power with the loudspeaker impedance. MLS™ switches are available on four SMPS models, the LAB 1200C, LAB 1600, LAB 2002 and the LAB 4000.

**Radio interference**  
Lab.Gruppen switch mode amplifiers were the first with low enough emissions, not to interfere with wireless microphone systems. The LAB 1300C was the first professional switch mode amplifier to be approved to the European EMC directive.  
All products have also been approved for immunity against electromagnetic fields, high voltage flashes and radio interference.



Graph showing the RF emission from the LAB 1300C. Upper lines are the IEC-limits.

\* Continuous power on one channel driven or peak power on both channels driven. (Thermal protection may occur at high continuous power.)

\*\* Not recommended selection. (Overcurrent protection may accour.)



### LAB 1300C

- |                              |        |        |        |
|------------------------------|--------|--------|--------|
| Power specifications: stereo | 8 ohms | 4 ohms | 2 ohms |
| EIA at 1 kHz and 1% THD      | 350 W  | 650 W  | 900 W  |
- ◆ Cooling; Two proportional speed fans
  - ◆ Protection; Short circuit, DC, high temperature, turn on, VHF, over and under voltage and clip limiters
  - ◆ Dimensions in mm (inch); 483 (19")W × 88 (3.5")H × 310 (12.2")D
  - ◆ Weight; 8 kg (18 lbs)



### LAB 1600

- |                              |     |        |        |         |
|------------------------------|-----|--------|--------|---------|
| Power specifications: stereo | MLS | 8 ohms | 4 ohms | 2 ohms  |
| EIA at 1 kHz and 1% THD      | 4   | 430 W  | 840 W  | 1540 W* |
|                              | 2   | 230 W  | 450 W  | 870 W   |
- ◆ Cooling; Two proportional speed fans
  - ◆ Protection; ALS™ short circuit protection, DC, high temperature, turn on, VHF, over and under voltage and clip limiters
  - ◆ Dimensions in mm (inch); 483 (19")W × 88 (3.5")H × 310 (12.2")D
  - ◆ Weight; 8 kg (18 lbs)

New!



### LAB 2002

- |                              |       |        |         |         |
|------------------------------|-------|--------|---------|---------|
| Power specifications: stereo | MLS   | 8 ohms | 4 ohms  | 2 ohms  |
| EIA at 1 kHz and 1% THD      | 0 dB  | 1100 W | 1900 W* | 2900 W* |
|                              | -2 dB | 650 W  | 1100 W  | 1400 W* |
|                              | -4 dB | 350 W  | 680 W   | 1200 W  |
- ◆ Cooling; Two proportional speed fans
  - ◆ Protection; Short circuit, DC, high temperature, turn on, VHF, over and under voltage and clip limiters
  - ◆ Dimensions in mm (inch); 483 (19")W × 88 (3.5")H × 347 (13.7")D
  - ◆ Weight; 10 kg (22.1 lbs)



### LAB 4000

- |                              |        |        |        |         |
|------------------------------|--------|--------|--------|---------|
| Power specifications: stereo | MLS    | 8 ohms | 4 ohms | 2 ohms  |
| EIA at 1 kHz and 1% THD      | 0 dB   | 1300 W | 2100 W | 3200 W* |
|                              | - 2 dB | 820 W  | 1600 W | 2200 W  |
|                              | - 4 dB | 520 W  | 1000W  | 2000 W  |
- ◆ Cooling; Two proportional speed fans
  - ◆ Protection; AFS (Adaptive Fuse Saver), short circuit, DC, high temperature, turn on, VHF, over and under voltage and clip limiters
  - ◆ Dimensions in mm (inch); 483 (19")W × 88 (3.5")H × 347 (13.7")D
  - ◆ Weight; 10 kg (22.1 lbs)

# LAB.GRUPPEN ACTIVE FILTERS

## ACTIVE CROSSOVERS

ACN crossovers are designed for tri- or bi-amplified active loudspeaker systems. Four- or five-way systems require more than one unit (depending on whether there are required for stereo or mono operation). All models are state variable with 24 dB/octave Linkwitz-Riley filter topology, shelving equalization on each output, and configuration for mono sub bass operation.

ACN crossovers can be used as stand alone high or low pass filters with the remaining filters available as full range outputs.

*Crossover frequencies ACN 2C:*

80, 160, 250, 330, 400, 500, 600, 660, 800, 840, 950, 1000, 1100, 1200, 1300 and 1400 Hz.

*Crossover frequencies ACN 2S:*

40, 50, 60, 65, 75, 82, 90, 100, 110, 115, 125, 135, 140, 150, 160 and 165 Hz.

*Crossover frequencies ACN 3C:*

*Lo-Mid:* 80, 125, 170, 200, 250, 300, 350, 400, 440, 480, 530, 580, 620, 660, 700 and 750 Hz.

*Mid-Hi:* 500, 800, 1000, 1300, 1600, 2000, 2300, 2500, 2800, 3000, 3300, 3700, 4000, 4600 and 4800 Hz.

## DIGITAL SPEAKER PROCESSOR

The DSP 24 is a 2 in and 4 out digital crossover and speaker equalization system, which offers outstanding versatility for loudspeaker systems.

The DSP 24 combines the function of a 2-way stereo or 3/4-way mono active crossover unit, with a system equalization corresponding to a 66 band parametric equalizer. In addition, each output of the DSP 24 also has independent time delay, to acoustically align the speakers and/or drivers. Each output also has a mute switch, a digitally programmable analog gain control and limiter threshold with front panel control knobs.

## Visual Interactive Equalization Workbench, VIEW

The system equalization and crossover filters in the DSP 24 are user definable, in a proprietary software package, VIEW, running on a PC. A library of default setups, and a library of amplifier and speaker specifications are also included, to which the user can add any amplifier or speaker. The VIEW Pro software can import speaker measurements into the PC and suggest a "best



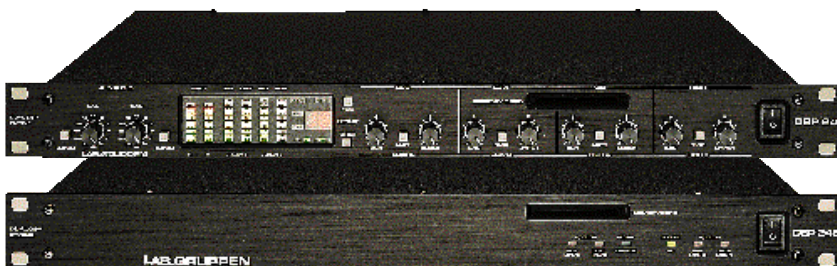
## ACN 2C / ACN 2S

- ◆ 2-way stereo or 3-way mono
- ◆ ACN 2C: 16 frequencies between 80 Hz and 1.4 kHz
- ◆ ACN 2S: 16 frequencies between 40 Hz and 165 Hz
- ◆ Filter slope: 24 dB/octave or 12 and 18 dB/octave optional
- ◆ Subsonic speaker protection: Highpass filter at 15 Hz and 12 dB/octave
- ◆ Mono bass switch
- ◆ Equalization: Low and high shelving equalization with boost at +12 dB max; adjustable on PC-board



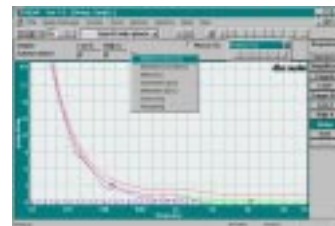
## ACN 3C

- ◆ 3-way stereo or 4- and 5-way mono
- ◆ 32 frequencies between 80 Hz and 4.8 kHz
- ◆ Filter slope: 24 dB/octave or 12 and 18 dB/octave optional
- ◆ Subsonic speaker protection: Highpass filter at 15 Hz and 12 dB/octave
- ◆ Mono bass switch
- ◆ Equalization: Low, mid and high shelving equalization with boost at +12 dB max; adjustable on PC-board



## DSP 24 / DSP 24B

- ◆ 2-way stereo, 3- or 4-way mono
- ◆ Up to 66 band parametric equalization on each output
- ◆ Crossover filters with 0 - 96 dB/octave slopes
- ◆ PC aided filter design of all possible characteristics, with crossover frequencies between 20 Hz and 20 kHz
- ◆ Precision time alignment of the loudspeakers and/or driver acoustic centres
- ◆ Programmable limiters on each output, with programmable threshold control knobs on the front panel
- ◆ DSP 24B installation variant (no front panel controls, PC control only)



Examples of windows in the VIEW software.

fit" equalization for each output, with an accuracy never achieved before. All parameters created by the software can be transmitted to one or several DSP 24 units via the serial communication or memory card, and stored in a non-volatile memory.