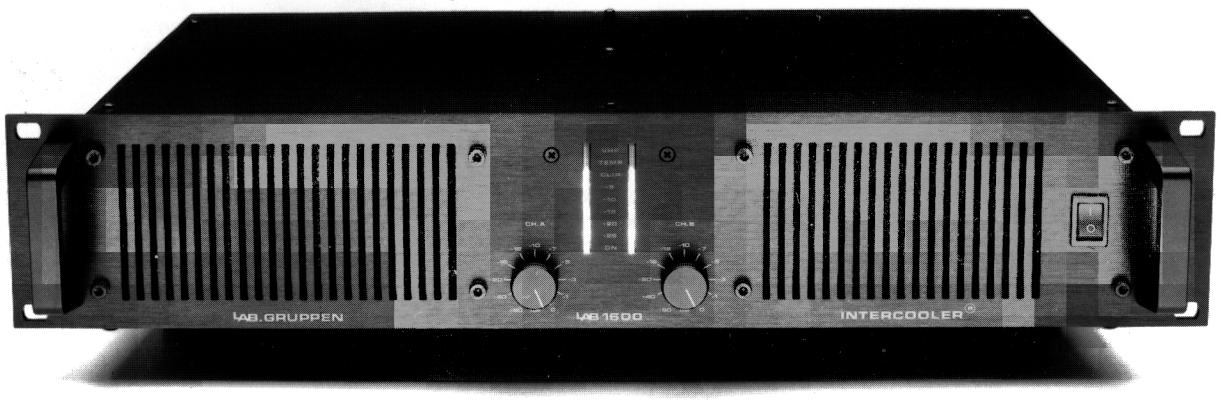
LAB 1600

Power Amplifier



Features

- **2 x 430 W into 8 Ω**
  2 x 840 W into 4 Ω
  2 x 870 W into 2 Ω
  at clip level with two channels driven
- **Compact design, 2 U high (88 mm)**
- **Low weight**
- **MLS switch offers full power in 4 or 2 ohms without increased power losses**
- **Electronically balanced inputs**
- **LED indicators show output voltage and headroom**
- **Independent protection circuitry**
- **ALS™ short circuit protection manages long-term short-circuit operations**
- **VHF protection**
- **DC protection**
- **Output cooled by Inter-cooler®**
- **Two proportional speed fans**
- **Clip limiter**

The LAB 1600 is a compact (2 unit high) light-weight(8 kg) power amplifier designed for high quality touring sound systems and fixed installations.

The chassis is made of 2 mm black anodized aluminium, with a 4 mm thick front panel. The switch-mode power supply is placed just behind the front panel to ensure noise free operation. Both the power supply and the two output channels are cooled by two proportional speed fans with airflow from front to back.

The switch-mode power supply is the modern solution of the weight and size problem. With switch technology operating at a high frequency, it is possible to use ferrite transformers instead of heavy iron transformers and large electrolytic capacitators.
Switch-mode technology has been applied in power supplies in TV-sets during the latest 30 years. But in the LAB 1600 the power capacitivity is 10 times larger.
We have designed the LAB 1600 to obtain the same caracteristics as a conventional power supply. Thanks to the switch-mode power supply it is easy to get the DC-rail voltage stabilized. This is made by controlling the magnetic energy in the ferrite transformer with a pulse width processor and magnetic "Flux Sense" windings.

Twenty-four 250 watt bipolar power transistors constitute the output stages, which are totally complimentary. The power transistors are cooled by a solid copper cooler, called Intercooler®, originally designed for our LAB 1300 power amplifier. LAB. GRUPPEN's specially designed thermal feedback circuit protects against thermal breakdown.

The LAB 1600 is completely short-circuit protected. The LAB 1600 is equipped with LAB. GRUPPEN's Adaptive Limiting System™ short circuit protection, which permits very high peak-currents, but still holds the transistors within the so-called Safe Operation Area, at the present operating voltage. This makes it possible to run loudspeakers with impedance variations, which are considerably lower than the lowest permitted impedance of the power amplifier.

Six more protection circuits, which are separate for each channel, protect the LAB 1600 and the loudspeakers:

Two DC protections; one DC current limitation protection, supplemented with fuses on each DC voltage power supply rail; and one DC voltage protection of Crowbar type, which works by short-circuiting the output to protect the load.

Thermal protection; prevents the LAB 1600 from being overheated. The protection indicators on the front panel are switched on, as a warning, before the protection occurs.

AC protection; shuts down the outputs if the line voltage is outside the operating voltage of the LAB 1600.

VHF protection (Very High Frequency); protects the loudspeakers against strong nonmusical signals above the audible area.

Clip limiter; prevents severly clipped waveforms from reaching the loud-speakers, but maintains full peak power.

All electronics are mounted on four modules. The modules are easily accessible for replacement or repair, etc.

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LAB 1600 Specification

MAX OUTPUT POWER [1]	MLS Switch	FTC 20 Hz-20 kHz at 0,1% THD	EIA 1 kHz at Clip	IHF Peak Power 20 ms burst
8 Ω stereo	4	410 W	430 W	440 W
4 Ω stereo	4	780 W	840 W	850 W
2 Ω one channel [2]	4	1440 W	1540 W	1590 W
2 Ω stereo	2	780 W	870 W	930 W
8 Ω bridged	4	1560 W	1680 W	1700 W
4 Ω bridged	2	1560 W	1740 W	1860 W

SPEAKER PROTECTIONS
Each channel is fuse protected on the positive and negative power supply rails. Electronic short-circuit protection with a progressive characteristic. The output power is turned off at shorted output. The power amplifier can be run into short-circuits for a long time without damage, and is open circuit and mismatch proof.

DISTORTION		
THD 20 Hz-20 kHz and W-750 W	4 ohms	0.07%
THD at 1kHz and 750 W	4 ohms	0.01%
DIM 30 at 400 W	4 ohms	0.008%
CCIF (13 and 14 kHz) at 200 W	4 ohms	0.008%
SMPTE (60 Hz and 7 kHz) at 400 W	4 ohms	0.01%

POWER BANDWIDTH [3]		5 Hz-110kHz
Slew rate		60 V/µs
OUTPUT IMPEDANCE	1 kHz	0.03 ohm
HUM AND NOISE below max power		<- 105 dBA
CHANNEL SEPARATION	1 kHz	80 dB
	10 kHz	70 dB

PHASE AND DELAY		
Deviation from perfect delay	150 Hz-20 kHz	± 1°
Total delay input to output at 4 ohms		3.5 µs

INPUTS	
Sensitivity, switchable for full output into 4 ohms	0.775 or 1.8 Vrms
Gain, switchable	37.5 dB or 29 dB
Impedance	20 kohms, balanced
Common mode rejection at 1 kHz	50 dB

FRONT PANEL		
Gain controls		(2) Channel A-B
Output display	(2) red + (10) green LED's	Fast peak - slow release
Temp indicator	(2) yellow LED's	80°C at heatzink
Protect indicator	(2) yellow LED's	> 20 kHz at full power or shorted output.
On indicator	(2) green LED's	DC rail voltage for channel A and B

REAR PANEL	
Input connectors	(2) XLR type 3 pin female (pin 2+), and (2) 1/4" jack
Output connectors	(2) Neutric 4-pole speakon connectors (pin 1+ output)
Switches:	
Gain	37.5 dB or 29 dB
Link	Tandem mono, channel A and B
Rev B	Phase reverse of channel B
Clip limiter A and B	On - Off
MLS	2 or 4 ohms

POWER	Option	
Operation voltage	120 V - 270 V	75 V - 135 V AC
Minimum start voltage	190 V AC	95 V AC
Full output power	180 V - 260 V AC	90 V - 130 V AC

OVERALL DIMENSIONS mm (inch)	483 (19") W x 88 (3.5") H x 300 (11.8") D
WEIGHT	8 kg (18 lbs)
APROVALS	CE

1) Specifications measured with 230 V regulated AC
2) Continuous power, one channel driven, or peak power both channels driven. (Thermal protection may occur at high continuous power).
3) The VHF-protection turns off the channel for frequencies above 20 kHz, at full power.

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