

ENGINEERING INFORMATION

The RACKDP-50 from Turbosound represents an industry first. Never before has it been possible to economically purchase a shallow 2U rack mounting 4 channel power amplifier with this level of flexibility and power density. RACKDP integrates lightweight power supplies, high power sonically transparent Class D amplifiers, full system monitoring (including 'end of line') and a fully featured USB or network controlled 24 bit 96kHz DSP processing platform provided onboard as standard.

RACKDP is designed to provide a solution rather than be just a component in a system. From the very first project concepts we considered the critical issues that would be confronted by our customers such as integration, cost, serviceability, size and flexibility. Above all RACKDP sounds superb, and this is not just our opinion. We realise that innovative designs and production techniques are of little value if audio performance is compromised. Sonics are at the heart of our philosophy and we set extremely high standards for ourselves.

Modern Amplifier Design

RACKDP-50 contains four 1250W channels of class D amplification. The benefits in efficiency and power density that modern class D switching amplifiers (also known as PWM amplifiers) have over conventional types are well known. Equally recognised is the detrimental effect on sound quality that such an approach can often bring.

To achieve top-flight performance a 'back to basics' approach was employed. Rather than trying to invent ever more complicated schemes for getting round the inherent difficulties with class D, effort was concentrated on identifying and eliminating the problems associated with well known topologies and optimising these solutions to take advantage of modern state-of-the art power semiconductors. The resulting design has a short signal path and turns the limited negative feedback inherently available in switching designs from a problem to an advantage. This directly results in clean, fast amplification that does not compromise the high efficiency of class D. In



FEATURES

Proven Class D amplifiers

Four 1250W bridgeable Channels

2 Ohm and 70v/100v Line Capability

96kHz DSP with Real-Time Monitoring

Extremely Rugged with Abuse Logging

Live Networked Control and Monitoring or 'Configure & Leave' Operation

APPLICATIONS

Concert touring

Regional touring

Permanent installations

fact, the RACKDP-50 is so efficient that even though capable of a total power output in excess of 5000W, the variable-speed fans only run at high speed under extreme conditions.

Power Supply

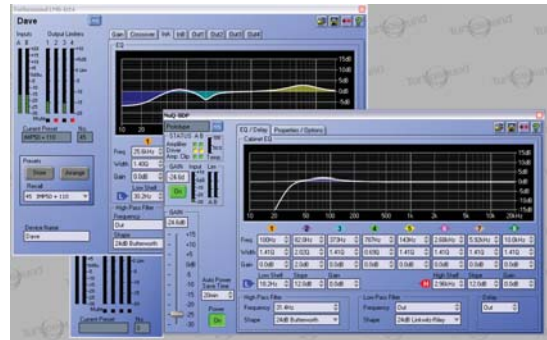
The advantages of switching technology have been carried through to the power supply. We have developed an extremely efficient lightweight power supply to partner the amplifiers. The design has been evolved in harmony with the amplifier section and therefore achieves an optimum match between the two saving significant space. This holistic approach also yields some important performance benefits by eliminating potential sources of noise and distortion. Other useful features are also provided such as the intelligent detection of the mains supply voltage which means that the unit is suitable for global operation without requiring any reconfiguration.

Digital Signal Processing

Each pair of RACKDP channels contains a complete 96kHz digital loudspeaker management and control subsystem. Although significant expertise was required to integrate the DSP and supporting electronics rightly with the amplifiers, the RACKDP DSP platform is in no way compromised, containing as it does an extremely powerful state-of-the-art floating point SHARC based DSP engine. Critical components in the audio path, so important to the sound quality, have been selected with great care and after extensive listening tests. Our choices have resulted in performance that in independent assessment

equals the finest stand alone processors. A simple PC connection allows customers to manipulate DSP parameters so as to optimise the performance and develop settings for particular applications.

These settings are stored in the RACKDP so a PC is not necessary for operation. RACKDP also has the capability to

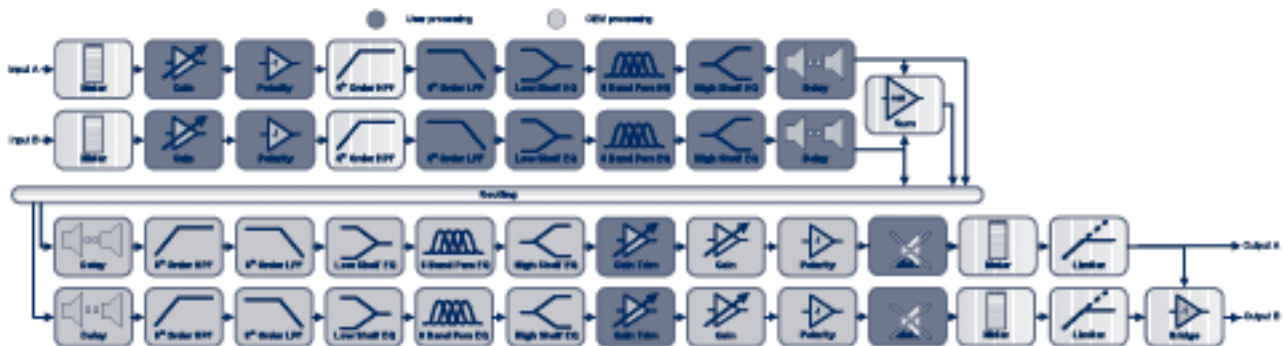


recall up to four different sets of settings (voices) by the means of rear panel contact closure inputs. This can be particularly important in voice evacuation applications where, for example, it may be required to mute the current source of audio, switch to an alternate input carrying an evacuation message and broadcast it with different level and EQ settings. Each pair of RACKDP channels can automatically do this either independently or collectively.

PC Control and Telemetry

All RACKDP models are networkable as standard; there are no expensive options to purchase. Turbosound's TurboDrive PC

Signal Processing Block Diagram



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application provides real-time control and monitoring functions to either single units or whole networks of products. Indeed, in addition to RACKDP, TurboDrive offers a unified interface to control any products that conform to the BvNET / Obcom standard in Turbosound's DP series powered speakers and LMS series crossovers.



A PC connects to RACKDP either directly via USB or BvNet using a BvNet interface. Networked RACKDPs allow system installers to more easily optimise the performance of individual speakers in a space. This can solve a number of common problems that cannot be addressed adequately with the traditional approach of one centralised system controller. In addition to control, networked RACKDPs and TurboDrive allow all the important system parameters to be monitored and displayed, alarms being raised if problems are detected. This monitoring extends to load impedance and so can give early warning of impending driver failure, useful in all situations but a vital requirement in life safety applications.

Protection Systems

Sophisticated micro-processor controlled amplifier protection systems continuously monitor all aspects of performance to assure the RACKDP and drivers are always working within their safe operating areas. One of the aims of the system is to produce an output whenever it is deemed safe to do so even under extreme or abusive conditions. If circumstances dictate that full power is not possible, the RACKDP will progressively

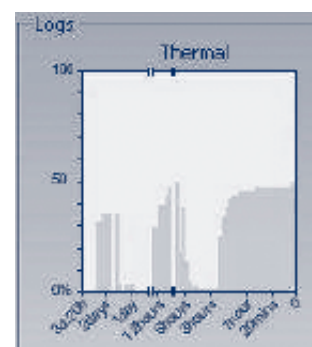
decrease the audio level while endeavouring to find a stable operating level.

Muting will only occur when it is absolutely not safe to continue, at which point the unit will shut down until it is safe to deliver power again, automatically recovering in an elegant manner.

Total Design and Manufacture

RACKDP's modular design is highly evolved with a low component count and excellent manufacturability. These attributes translate directly to high reliability and lower costs. Turbosound's production team combine this solid engineering with state-of-the-art production facilities and custom designed automatic test equipment geared to produce the products efficiently, consistently and economically. Turbosound attaches great importance to traceability in the manufacturing process. To this end every RACKDP and every sub-assembly inside an RACKDP has a unique bar-coded serial number. This allows the fully automated manufacturing and quality assurance tracking system to establish the precise build standard of a particular unit right down to component level. This sort of traceability, as well as a step to achieving ISO9001 accreditation, can give customers confidence that Turbosound can quickly establish the history of a given unit should that ever be required.

Abuse Monitoring



Even without a PC connection, RACKDP continuously records logs against time for 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 and their data can even be exported to a spreadsheet for further analysis. This makes it easy to assess how systems have been used when customers have reported problems.

INPUT IMPEDANCE	6.7k Ohm unbalanced; 10k Ohm balanced
MAX INPUT LEVEL	+20dBu
FREQUENCY RESPONSE	20Hz – 20kHz±0.5dB (4 ohm load)
OUTPUT NOISE	-106dB A weighted ref. max output, 22kHz BW
DISTORTION	<0.05% (1kHz, -3dB output 22kHz BW)
PROTECTION SYSTEMS	
Over current	Initially gain reduced to maintain control, persistent over-current causes shutdown
Temperature	Limiters applied, persistent over-temperature causes shutdown
Brownout	Automatic protection and recovery
Mains	Soft-start current inrush limiting
DC Fault	Immediate shutdown, power cycle to recover
INDICATORS	
per channel	Sig, Limit -6dB, Limit
per channel pair	Power, Protect, Bridge, User DSP defeat
CONTROLS/CHANNEL	
Front panel	User DSP defeat (can be disabled with TurboDrive), Power switch
Rear panel	Two contact closure points, Shutdown input
MONITORING FACILITIES	Input signal level, Output signal level, Output current level, Temperature, Limiter operation, Protection system operation, Driver impedance
AMPLIFIER SECTION	
Number of channels	Four
Output power	1250w/ch @ 2ohms, 800w/ch @ 4ohms, 450w @ 8 ohms (RMS program, all ch. driven, 20Hz-20kHz) (bridged pair) 2500W @ 4ohms, 1600W @ 8 ohms, 900W @ 16 ohms
Slew rate	>80V/μs
Damping factor	120 ref 8 ohms
Efficiency	>90% typical
POWER SUPPLY	
Type	High current, high frequency switch mode
Efficiency	>90% typical
Input voltage	115V / 230V nominal ±10%
Input voltage selection	Automatic
Mains frequency range	45–65Hz
Other features	Automatic soft start, Automatic brownout recovery, Automatic over-voltage protection, Remote shutdown
THERMAL	One variable speed fan per pair of channels, additionally one variable speed fan per unit. Airflow is from front to rear
SIZE (H X W X D)	88mm (2U) x 482mm (19") x 360mm (14") (behind rack ears)
WEIGHT	9kg (20lbs)
OPERATING RANGE	Temperature: 0° to +40°C, Humidity: 0 to 80% (non-condensing)
CONNECTIONS	Mains (per RACKDP): Neutrik 'Powercon', Audio input & link (per channel): 3 pin XLR, Output (per channel): Neutrik NL4 'Speakon', Network (input and link): RJ45, Aux facilities: RJ45

Regulatory compliance: This product complies with the EMC and LVD directives 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), EN60065 Electrical safety. RACKDP also meets the requirements of FCC part 15B.
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