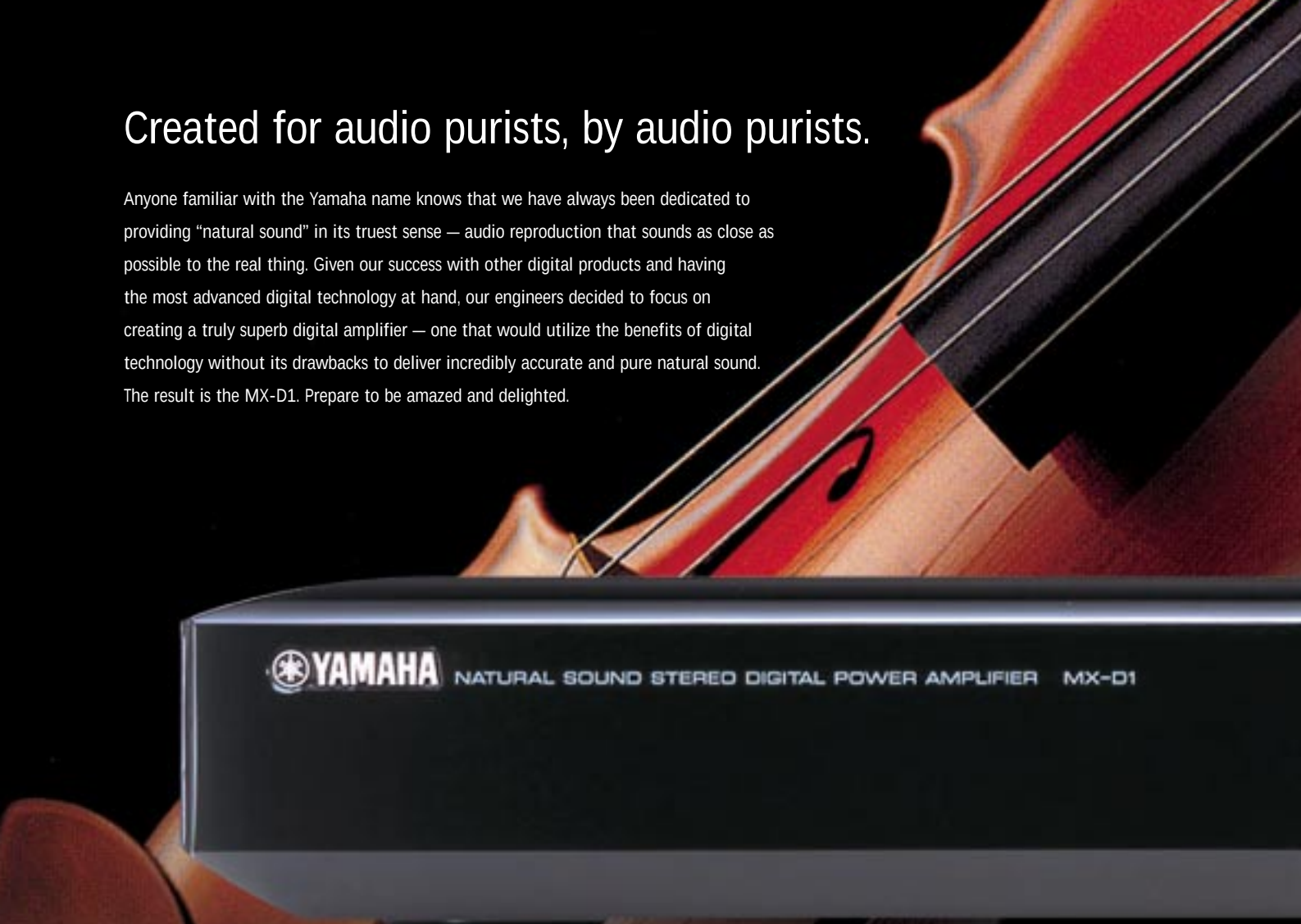
Digital Stereo Power Amplifier

MX-D1

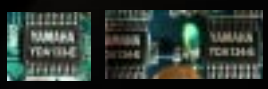
Created for audio purists, by audio purists.

Anyone familiar with the Yamaha name knows that we have always been dedicated to providing “natural sound” in its truest sense — audio reproduction that sounds as close as possible to the real thing. Given our success with other digital products and having the most advanced digital technology at hand, our engineers decided to focus on creating a truly superb digital amplifier — one that would utilize the benefits of digital technology without its drawbacks to deliver incredibly accurate and pure natural sound. The result is the MX-D1. Prepare to be amazed and delighted.



Power Engine Chipset Overcomes Digital Amplifier Limitations

Conventional digital amplifiers are very efficient but have serious sound quality and performance limitations. In its quest to overcome these problems, Yamaha developed its own Power Engine, a chipset that includes the YDA133 Modulator LSI and two YDA134 Power MOS Drive LSIs. The Power Engine enables the MX-D1 to achieve the high levels of sound quality and power expected of ultra-high-end audio amplifiers, as well as low power consumption and compact size.



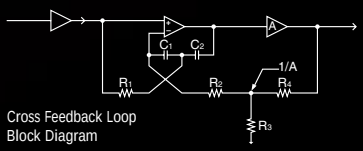
YDA133 Modulator LSI and two YDA134 Power MOS-FET Drive LSIs

Constant Gain PLL Modulator Circuit

This circuit eliminates the dependency of the output signal on power voltage fluctuation by using the YDA133 modulator LSI, which combines a PLL circuit with a modulator circuit. The modulator circuit operates synchronously with a standard clock to provide a PWM output waveform at a fixed frequency of 352.8kHz, based upon two types of input information: the input music signal level and the output voltage at the power supply stage (+/-B). A synchronized multi-channel amplification system can be used without a carrier frequency beat for bi-amplification or a multi-channel home theater system with a backup amplifier.

Digital Cross Feedback Loop Circuit

The digital pulse output is fed back by the Digital Cross Feedback Loop, improving the linearity of the output stage and of the modulator circuit. This achieves superior low distortion characteristics and high dynamic range. In order to achieve higher negative feedback, the MX-D1 uses two CR filters.



Cross Feedback Loop Block Diagram

Advanced Analog Feedback

The 352.8kHz carrier signal is removed by the fc 30kHz output LC filter, and forwarded negative feedback is added to achieve amplification over a wide bandwidth of 100kHz and with a high damping factor (over 200), without load impedance dependency.

Active Power Control System

The maximum output of a conventional amplifier is determined in most cases by the power voltage clip level. The Active Power Control System detects the output current to control the voltage limiter value in order to independently control the continuous maximum output and dynamic power at load impedance values of 2—8 ohms. This system makes it possible to continually provide the amplifier’s maximum performance at speaker load.

Direct Drive High-Efficiency Power Supply and Magnetic Coupling Rectification Circuit

The power circuit is equipped with the newest version of the Yamaha patented voltage/current drive resonance type switching power source, which achieves low noise performance while retaining high efficiency. The secondary rectification circuit is a magnetic coupling rectification circuit that efficiently handles power damping. This circuit

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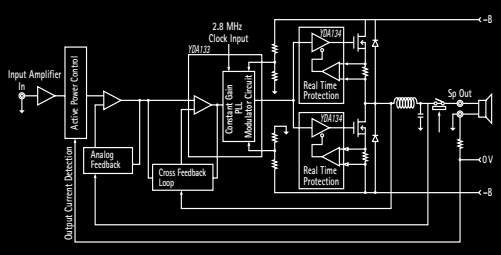
maintains symmetrical voltage regardless of the direction of the load current by forcefully linking the plus and minus power voltage outputs in the secondary winding of the power transformer. The switching frequency is 88.2kHz (2.8224MHz/8).

High-Speed Protection Circuits

Safe operation is assured by a complete set of protection functions such as over-current protection and DC protection. The amplifier has a super high speed current detection circuit in the YDA134 LSI that responds to the pulse current of a single wave digital pulse, and a Safe Operation Sequence Logic in the YDA133 Modulator LSI.



Digital Amplifier Block Diagram

Monaural Independent Construction

As you can see in the photo of the interior, the MX-D1 is divided into separate chambers in a design we call Twin Monaural Construction. This provides higher efficiency and ensures that there is no chance of electronic interference degrading performance. In addition to the two main left and right chambers, there are independent sections for the input amplifier circuit, output terminal board and power supply line filter board.

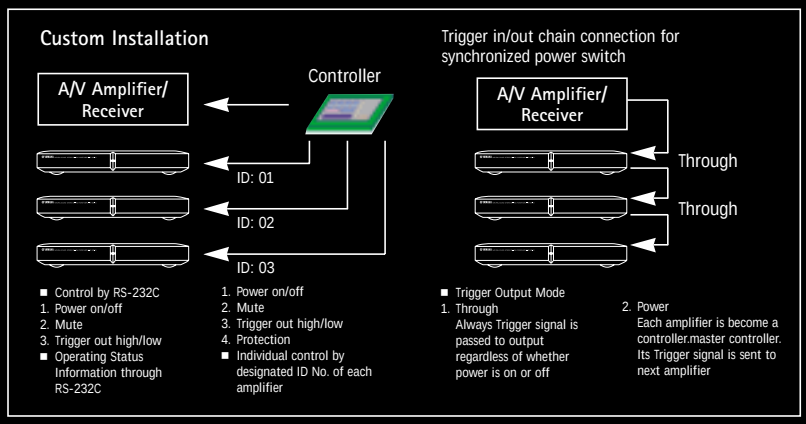
Highest Quality Parts

The discrete SEPP amplifier input circuit uses an unbalanced conversion circuit with low-noise FETs for wide dynamic range. The output filter, which has quite a large influence on sound quality, is a custom-made double-core, low-impedance toroidal coil with extra-large customized block electrolytic capacitors.
The 4-layer epoxy-resin-coated fiberglass PC board contains various high performance parts, such as 70µ copper foil for low line impedance, The rear panel offers gigantic WBT input and speaker terminals.

Extensive Vibration Damping

Yamaha went to great lengths to ensure that the MX-D1 is not subject to any type of vibration. It has 12mm-thick aluminum extruded front and side panels, a heavy, copper-plated steel inner chassis, an 18mm-thick heat dispersion/vibration damping block and point-controlled, anti-resonance feet. The top cover and rear panel also provide magnetic shielding.

MX-D1 Interior View



Custom Installation Compatibility
Using the MX-D1 in a custom installation is facilitated by its RS-232C interface for bi-directional control, ID setting for a multi-channel amplifier system and trigger in/out daisy chain connection for synchronized power switching via Through and Power modes.

Inlet-Type Power Cable
The power cable is separate, rather than attached to the unit. It is much thicker than ordinary power cables, for higher power handling capacity.

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MX-D1 Main Specifications

[AUDIO SECTION] • Min. RMS Output Power (8 ohms , 1 kHz, 0.1% THD): 500 W + 500 W • Dynamic Power/Channel (by IHF Dynamic Headroom measuring method): 1,000 W (2 ohms) / 1,000 W (4 ohms) / 850 W (6 ohms) / 700 W (8 ohms) • Dynamic Headroom: 3 dB (4 ohms) / 2.3 dB (6 ohms) / 1.5 dB (8 ohms) • Damping Factor (1 kHz, 8 ohms): 200 • Input Sensitivity/Impedance (500 W/8 ohms, Unbalanced/Balanced): 1.3 V/25 k-ohms • Frequency Response: 1—100,000 Hz ±3 dB • Total Harmonic Distortion (Unbalanced/Balanced to Sp Out, 1 kHz, 10 W/8 ohms, 20 kHz LPF): 0.003% • Signal-to-Noise Ratio (IHF-A-Network, Unbalanced/Balanced, S: 1.3 V, Input Shorted, 20 kHz LPF): 120 dB • Residual Noise (IHF-A-Network, Unbalanced/Balanced, 20 kHz LPF): 63 µV • Channel Separation (1 kHz, Unbalanced/Balanced, Input 5.1 k-ohms Shorted): 100 dB • Muting: –∞

[GENERAL] • Standby Power Consumption: Less than 0.1 W • Dimensions (W x H x D): 435 x 75 x 437 mm; 17-1/8" x 2-15/16" x 17-3/16" • Weight: 10.4 kg; 22.9 lbs.

For details please contact:

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