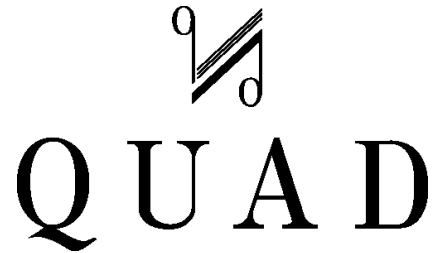

QUAD



99 Series

High Performance Audio Systems

and

Electrostatic Loudspeakers.



Peter Walker - Founder of
Quad Electroacoustics

The 99 Series is only Quad's sixth range of products in a period of over 60 years as a manufacturer of high quality audio equipment. Each new series has taken advantage of the latest advances in technology, whilst also building upon Quad's philosophy of competent design engineering; quality in manufacture and an ongoing concern for the customer.



Quad Ribbon Speaker

Since Peter Walker formed the company in 1936, all Quad products have displayed an originality in design, born from a full and proper understanding of every aspect of sound reproduction. A world leader in audio amplifier and electrostatic speaker design, Quad has, over the years, made a major contribution to the improvement of sound quality. This contribution has been recognised by awards from around the world including the Queen's Award for Technological Achievement in 1978 - the only one ever presented to an audio hi-fi equipment manufacturer.



Quad ESL-57

The 99 Series is a high quality entertainment system that joins together high-performance Quad components into an easy-to-use package. Partnered with the outstanding ESL full-range electrostatic loudspeakers, the result is a music reproduction system that is both neutral and transparent. Elegant in appearance and elegant in engineering design, the 99 Series maintains Quad's objective of achieving, the 'closest approach to the original sound'.

For many people, buying their first Quad sound system can be a life changing experience. They enjoy the confidence of knowing that the complete system has been engineered to achieve optimal performance, free from compatibility problems. They relax in the knowledge that Quad's legendary service department will give support throughout the system's useful life. They derive pleasure from knowing that Quad is a company of individuals who care about both the design and construction of their products, while sharing their love of music. These are just some of the reasons why we now serve the children and even grand children of our first customers.

Chairman.



Quad II Power Amplifier



FM3 Tuner & 33 Pre-Amplifier



303 Power Amplifier

The history of Quad is one of technical achievement in the field of sound reproduction. It is a story that began with the Quad 1 amplifier which brought the benefits of 15 years knowledge and experience in professional audio and industrial products to the task of making the most accurate domestic audio amplifier of its age.

A few years later, the product which set the standard for amplifiers was the Quad II Power Amplifier that was introduced in 1953, the year of Queen Elizabeth's Coronation and the year in which Mount Everest was finally conquered. This amplifier pioneered the principle of cathode coupling through the output transformer to reduce harmonic distortion to almost negligible levels. Such was its clear superiority that this model remained in production for 18 years.



34 Pre-Amplifier,

FM4 Tuner

306 Power Amplifier.



44 Pre-Amplifier



405 Power Amplifier

Three years later in 1956, Quad demonstrated the first true full-range electrostatic loudspeaker. This remarkable product (known later as the ESL-57) used a virtually mass-less plastic film as a moving diaphragm between two charged plates. Compared to the loudspeakers of the time, the ESL was free of unwanted colourations and distortions. This landmark product remained in production, virtually unchanged, for 28 years.

A decade later in 1967 Quad introduced its first transistorised amplifiers; the 33 Control Unit and the 303 Power Amplifier. These amplifiers introduced a new 'Triples' output stage that solved all the thermal instability problems that plagued early transistor designs. Radical in both circuit design and appearance, they went on to win the Design Council Award in 1969.



R1 Remote

67 CD Player

66 Pre-Amplifier

66 FM Tuner

606 Power Amplifier



Amplifier performance took a further step forward in 1975 with the arrival of the Quad 405 'Current Dumping' amplifier. This remarkable new circuit topology remains one of the few truly original amplifier designs and has featured in Quad products ever since; the latest version being implemented in the 909 Power Amplifier. For this technology Quad was awarded the Queen's Award for Technological Achievement in 1978. Numerous other awards were presented to Quad from countries across the world.

In 1981 Quad announced the ESL-63; a full-range electrostatic loudspeaker based upon two sets of concentric annular electrodes fed through sequential delay lines. This patented system produces a sound pressure pattern identical to the theoretical ideal of a point source origin. Once again a Quad ESL loudspeaker became the reference standard around the world.



ESL-63 With Subwoofer

The arrival of the radical 77 Series in 1993 introduced the concept of a fully integrated sound system operated with a two-way remote control system.

The system boasted numerous

new types of circuit technology as well as some of the most advanced control software seen in a consumer product. Two years after the launch, Quad was presented with the 'European Amplifier of the Year' award for the 77 Series Integrated Amplifier.



ESL-63



Queen's Award.

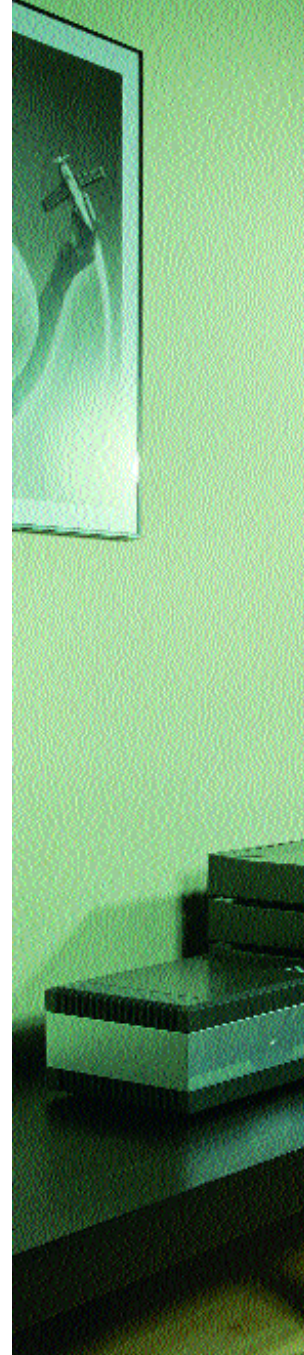
These are some of the highlights from Quad's pedigree line of technological achievement. However, it must always be remembered that Quad has never indulged in technical 'one-upmanship'. The technology is there for a purpose - and that purpose has remained constant over the years. To reproduce music in a form that is as close to the original performance as possible.



Quad sound systems have always been able to give their owners the utmost pleasure and passion when they listen to music; no matter what the choice of music. But now the new 99 Series brings more.

Conceived as an integrated system, there is an assurance of absolute compatibility across all system components and the convenience offered by the high levels of intelligence exhibited in the control system.

The 99 Series can offer all the flexibility of a high-performance separates system with many adjustable controls and extensive tone control facilities, yet is delightfully simple to install and set-up. Thereafter, operation is simply a matter of point and play, using the intuitive yet comprehensive remote control handset.





This latest Quad system has been conceived for the user who wants to have all the benefits of owning a hi-fi system - the performance of which is amongst the best in the world - yet doesn't want to get involved in the technicalities of the subject. The user has the confidence of knowing that Quad have employed all the knowledge and technology available today, to deliver a standard of sound reproduction, almost to the point of perfection. Our aim is to give the customer the best opportunity to enjoy their music without letting technology get in the way.

With the 99 Series, Quad offers fine performance; convenience of use; quality of construction; enviable long term support, but most of all, the pedigree of a company that has built a long-term reputation on the ability to reproduce recorded music in a manner that is the closest approach to the original sound .

99 Series Pre-Amplifier

State of the art performance combined with unique operating features sets the Quad 99 Pre-Amplifier apart from competing products.

The combination of universal phono-socket inputs and Quad Link inputs gives the ability to connect an almost unlimited number of sources, each with optimal matching. All inputs, including those for moving-coil and moving-magnet cartridges, have adjustable sensitivity whilst the main outputs have adjustable levels settings.

This flexibility also extends to the wide range of precise tone-control adjustments that can be made. In addition to the usual high-frequency filter, there are adjustments for the



bass response, and the unique Quad 'Tilt' control which skews the entire frequency response to give a preferred tonal balance.

The 99 Pre-Amplifier is packed with technical innovation including noiseless solid state signal switching and digitally addressed analogue volume and balance controls. These track both left and right channels with a previously unattainable accuracy of better than 0.1dB.

99 CD Player

The 99 CD Player differs from many conventional designs because undue emphasis is not placed upon the 'headline' specification of the digital-to-analogue conversion system, instead more emphasis is placed on the ability to read and accurately decode all the information on the disc. It's self-evident that the loss of significant information from the disc cannot be fully compensated for by subsequent processing.

A high-performance CD transport is used in conjunction with Quad's exclusive servo system hardware and software. This has been developed to recover the maximum amount of error-free data from the disc, even when the disc is marked or mildly out of specification.



The digital data is converted back into an analogue music signal by a 'Delta-Sigma' modulation decoder. The novel conversion is not dependent upon timing accuracies and so avoids the problems normally associated with clock jitter.

Through the application of intelligent design the Quad 99 CD Player achieves a performance which borders on the theoretical optimum for this music format.

99 FM Tuner

In many countries FM radio still has the potential to provide high fidelity programme quality. The Quad 99 FM Tuner has been designed to make the best use of that potential.

The UK has gained a world-wide reputation for the high-quality music broadcasts transmitted by the BBC, and as a result British manufacturers such as Quad have considerable experience in designing tuners that receive and reproduce music realistically. The Quad 99 FM Tuner incorporates that experience in full.



99 Series Power Amplifier

Quad power amplifiers have always been amongst the finest in the world. Over the years, they have earned a reputation for being 'straight wires with gain', because they neither add nor take anything away from the original music signal.

The 99 Stereo Power Amplifier maintains this tradition. It uses a dual complementary feedback circuit with exceptional stability margins to achieve exemplary performance and an output of over 80 watts per channel. Overload recovery is instantaneous and the amplifier is fully protected against over-driving or misuse, without resorting to output line fuses or relays, which degrade the quality of the signal fed to the loudspeakers.



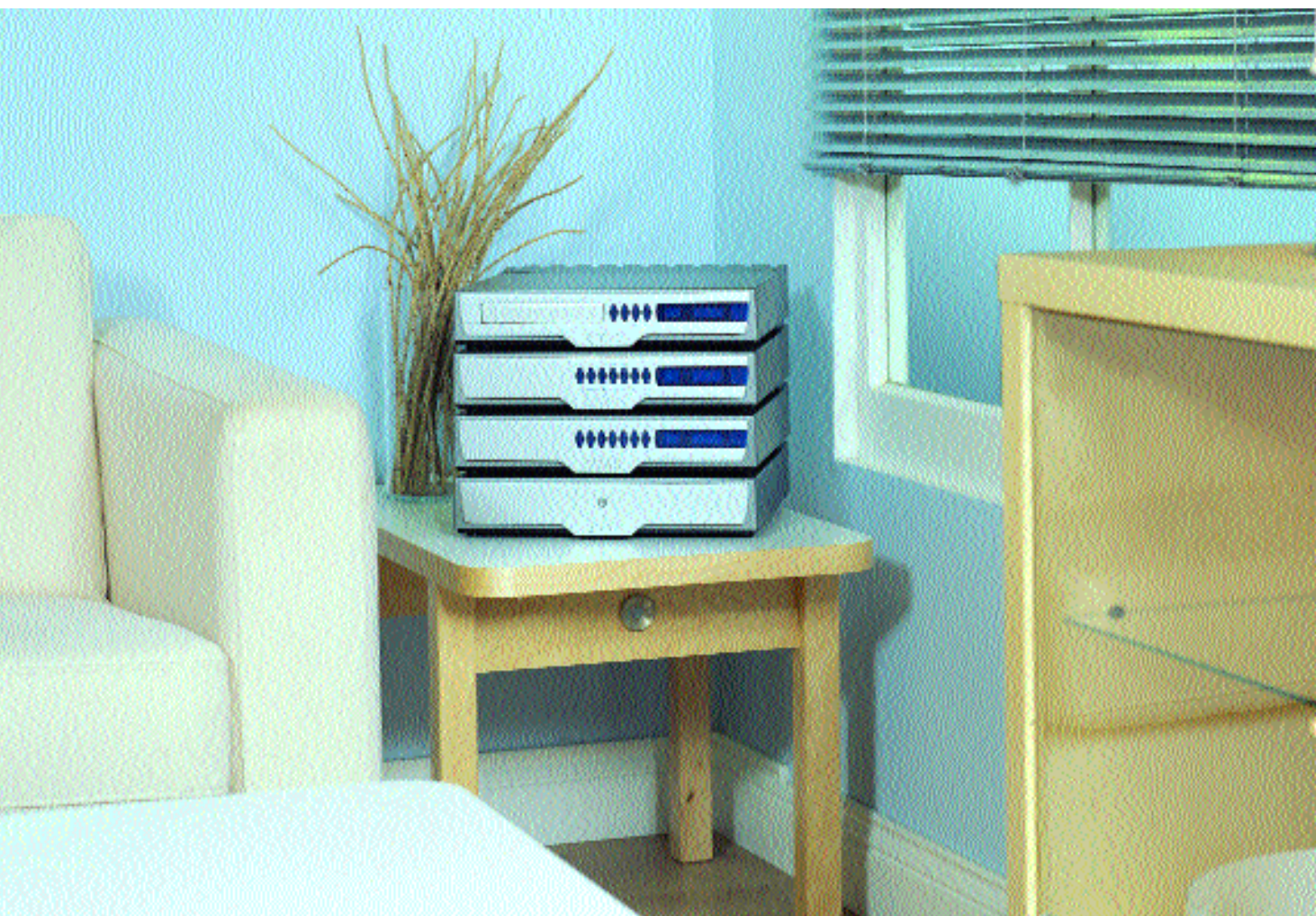
The 99 Stereo Power Amplifier can be safely used to drive most types of loudspeaker, both Quad's own ESL models and conventional models made by other manufacturers.

99 Mono Power Amplifier

Powerful amplifiers can more faithfully reproduce the dynamics of the music, enabling the user to have a wider choice in the selection of loudspeakers, particularly when less efficient models are being considered. Power is something that this 99 Mono Power Amplifier has in abundance. Into a nominal 8 ohm load it delivers well over 150 watts and a breathtaking 250 watts into a 4 ohm load.

In all other respects, this amplifier is close to the 99 Stereo Power Amplifier and shares its technology and topology as well as its excellent standards of performance.





Quad 909 Amplifier



The 909 Stereo Power Amplifier incorporates Quad's patented current dumping technology and is one of the finest audio amplifiers available today.

The current dumping technique eliminates many of the problems associated with transistor amplifiers giving a consistent and predictable performance without a need for the fine tuning adjustments on the production line.

Quad 909 Amplifier

In current dumping amplifiers there is a very high quality low power output amplifier and a very high power output amplifier whose performance is not critical. This high power output amplifier controls the loudspeaker at all times and provides the current or 'muscle' to generate the sound. The low power output amplifier is arranged to generate a signal that compensates for errors between the input signal, and the signal fed to the loudspeakers. The end result is that the quality and accuracy of the output signal

depends only upon the performance of the low power amplifier. In the Quad 909 this low power output amplifier has been engineered to the highest standards.

The problems of crossover distortion; quiescent current adjustment; thermal tracking and transistor matching all disappear. If such a thing as a perfect amplifier were to exist, then the Quad 909 would be very close to that perfection.

Electrostatic Loudspeakers

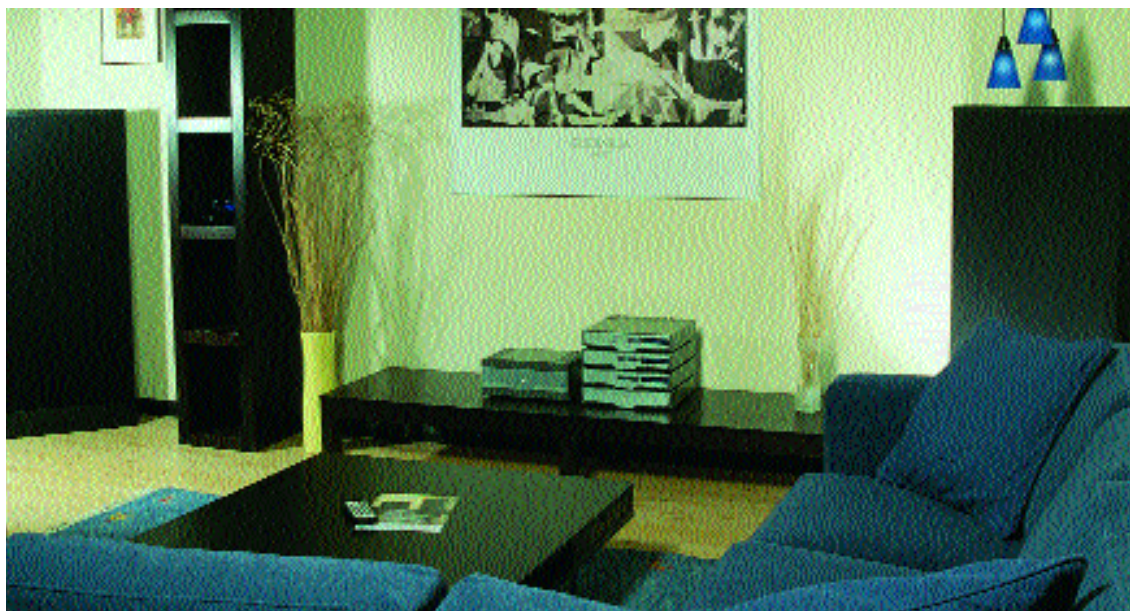
Quad's electrostatic loudspeakers are regarded as the world's most transparent loudspeakers, able to virtually eliminate distortions and colourations. In fact, Quad's ESLs are the only loudspeakers that can perfectly reproduce a square wave; demonstrating their ability to track the musical signal exactly.

The ESL is fundamentally different in design from conventional loudspeakers. Whilst most models use cone type drive units, Quad uses the full-range electrostatic principle, first introduced in 1956. The sound is not created by a cone but by a very thin diaphragm, less than one tenth the thickness of a human hair. This ultra-low mass diaphragm is coated with a conductive material and is stretched between two fixed electrode plates. The electrodes carry a positive charge and the diaphragm carries a negative charge. The size of the charge on the electrodes rises and falls to track the waveform of the musical signal; so attracting and repelling the diaphragm closer to and

further from the electrode plates. It is the movement of the almost mass-less diaphragm that creates the sound we hear.

The diaphragm is mounted on an open frame and so is free of the 'boxy' colourations that plague conventional loudspeakers. Instead of multiple drive units separated by crossover networks, the ESL is a full-range driver covering the entire musical spectrum without any discontinuities. The result is an extraordinary resolution of detail; an excellent transient response and an unrivalled sense of immediacy and presence.

Quad's ESL system, however, takes the performance of electrostatic loudspeakers a step further. Acousticians have long recognised that the ideal loudspeaker should be a point source from which the waves of sound radiate in a fashion rather like the ripples resulting from a pebble dropped into a lake. It is obvious that



large cones and even larger electrostatic diaphragms cannot be point sources, so how can they be made to behave more like the perfect loudspeaker?

Quad solved the problem with an elegant engineering solution that was subsequently awarded a patent. Instead of a large single electrode, Quad designed a number of electrodes arranged as a series of concentric rings. Each electrode is fed through a calibrated delay line so the sound first leaves the centre of the speaker then, after a short delay, the sound leaves the next ring and so on. The delayed sounds build up into a

spherical waveform identical to that produced by a theoretical point source. This innovative step brought closer the achievement of the perfect loudspeaker.

The Quad ESL is a premiere music reproduction loudspeaker constructed from the finest materials with meticulous attention to detail. It reaches the pinnacle of high-fidelity performance with an unparalleled ability to sonically 'disappear', and create convincing three-dimensional sound stages. Instruments and vocals occupy precise, accurately sized locations in space, giving an uncanny realism to reproduced sound.

Quad ESL-988

The ESL-988 replaces the much loved ESL-63 model. Although of similar size and proportions, the resemblance is only skin deep - for more than 90% of the internal components have been re-designed, upgraded, or modified.

The new model has better audio transformers, a new power supply, improved diaphragms, a strong heavyweight moulded base and new grille assemblies. Particular attention has been given to the structural integrity of the loudspeakers, which has been improved beyond all recognition.

The end result of these changes is an electrostatic loudspeaker that is as relevant today as its predecessor was 18 years ago. The Quad electrostatic loudspeakers continue to be in a class of their own.



ESL-988



Quad ESL-989



ESL-989

The ESL-989 shares much of its technology with the ESL-988, but it is a larger model with two extra bass panels and a higher rated power supply. The extra panels increase the bass output, but also contribute to an enhanced performance in the mid-band.

The ESL-989 is Quad's finest loudspeaker. It is a true full range loudspeaker reproducing music with an ease and naturalness which is best described as uncanny. It has a virtual absence of the familiar loudspeaker problems of colouration, distortion, phase and frequency response errors. All that remains is the music and the original ambience. To the listener these are the very ingredients needed to create a real sensation of 'being there'.



99 Series System

- * 'Quad Link' bus system allows the simple connection of all Quad 99 Series units with balanced line audio transmission.
- * All inputs have programmable adjustable sensitivities.
- * In addition to the 'Quad Link' bus inputs, the Pre-Amplifier Control Unit has 3 auxiliary inputs, plus a tape loop and turntable connections.
- * The turntable input is compatible with both moving magnet and moving coil cartridges, switchable via the front panel.
- * The array of useful tone adjusting controls feature Bass Cut and Boost; HF filtering and Quad's unique full response tilt control.
- * The tuner has 25 pre-set stations with optimal tuning software to ensure the best reception at all times.
- * All Quad power amplifiers are fully protected against overload and feature high-efficiency toroidal transformers. They feature 'Quad Link' inputs together with conventional phono socket inputs.
- * All of the Quad 99 Series products are built to the highest standards with top quality components to ensure consistent long - term performance. 99 Series products are built with die-cast aluminium cases and front panels.
- * Virtually all the 99 Series functions and features can be accessed by a 'simple - to - use' infra-red Remote Control handset.

Technical Specifications

99 Pre-Amplifier Control Unit

Aux. & Tape Inputs	
Sensitivity	100, 300 or 775 mV
Signal - to - Noise - Ratio	>97 dB (A) ref. 775 mV
Distortion	<0.002%
Phono Inputs MM (MC)	
Sensitivity	1, 3 or 7.75 mV (100, 300 or 775 μ V)
Signal-to-Noise-Ratio	78 dB (A) ref. 7.75 mV (775 μ V)
Distortion	<0.005% (<0.01%)
Pre-Amp Output	
Level	775 mV (3.3 volts maximum)
Source Impedance	100 ohms
AMPBUS Output	
Level	2 volts (8 volts maximum)
Source Impedance	20 ohms
Tape Output	
Level	100, 300, 775 mV (10 volts maximum)
Source Impedance	330 ohms
Frequency Response	
All inputs except MM & MC	10 Hz to 20 kHz +0dB/-0.3dB
	3 Hz to 56 kHz +0dB/-3dB
MM & MC inputs	20 Hz to 20 kHz +/-0.5dB
	7 Hz to 53 kHz + 0.5dB/-3dB
Dimensions (H x W x D)	70 mm x 321 mm x 310 mm

99 Series CD Player

Frequency Response	20 Hz to 20 kHz +/- 0.1 dB
Signal - to - Noise - Ratio	>100 dB (20 Hz to 20 kHz)
Total Harmonic Distortion	<0.02% at 1 kHz full output level
Dimensions (H x W x D)	70 mm x 321 mm x 310 mm

99 Series FM Tuner

Tuning Range	88 to 108 MHz
Channel Spacing	50 kHz
Sensitivity (30 dB quieting) (50 dB quieting)	Mono 8 dBuV Mono 18 dBuV Stereo 18 dBuV
Full Limiting	< 1 uV (1.2 dBf)
Signal - to - Noise Ratio (1mV, 1 kHz)	Mono 72 dB (A) Stereo 67 dB (A)
Distortion (1 kHz, 25 kHz deviation)	Mono 0.03% Stereo 0.05%
Capture Ratio	1.5 dB
IF Rejection	> 100 dB
AM Suppression	> 60 dB
Image Rejection	> 80 dB
Pilot Tone Suppression	> 60 dB
Cross-talk	- 40 dB at 1 kHz
De-emphasis	50 uS or 75 uS
Aerial Input	2 x 75 ohms un-balanced
Dimensions (H x W x D)	70 mm x 321 mm x 310 mm

99 Series Stereo Power Amplifier

Maximum Power Output	90 watts RMS into 8 ohms (0.5% THD) 120 watts RMS into 4 ohms (0.5% THD)
Maximum Output Current	11 Amps peak each channel
Total Harmonic Distortion (70 watts into 8 ohms; 20 Hz to 20 kHz)	< 0.05%
Input Sensitivity (phono input)	775 mV
Output Impedance	1.5 uH in parallel with 0.05 ohms
DC offset voltage	less than 10 mV
Frequency Response	3 Hz to 50 kHz +0dB/-3dB
Signal - to - Noise - Ratio ref. 70 watts	110 dB (20 Hz to 20 kHz)
Dimensions (H x W x D)	70 mm x 321 mm x 310 mm

99 Series Mono Power Amplifier

Maximum Power Output	150 watts RMS into 8 ohms (0.5% THD) 220 watts RMS into 4 ohms (0.5% THD)
Total Harmonic Distortion (140 watts into 8 ohms; 20 Hz to 20 kHz)	<0.05%
Input Sensitivity (phono input)	775 mV
Output Impedance	1.5 uH in parallel with 0.05 ohms
DC offset voltage	less than 10 mV
Frequency Response	3 Hz to 50 kHz +0dB/-3dB
Signal - to - Noise Ratio ref. 100 watts	110 dB (20 Hz to 20 kHz)
Dimensions (H x W x D)	70 mm x 321 mm x 310 mm

909 Stereo Power Amplifier

Maximum Power Output	140 watts RMS into 8 ohms (0.5% THD) 250 watts RMS into 4 ohms (0.5% THD)
Total Harmonic Distortion (100 watts into 8 ohms) (20 Hz to 20 kHz)	<0.02%
Input Sensitivity (phono input)	775 mV
Output Impedance	1.5 uH in parallel with 0.05 ohms
DC offset voltage	less than 10 mV
Frequency Response	13 Hz to 40 kHz +0dB/-1dB
Crosstalk at 1 kHz	-90 dB at 1kHz
Signal - to - Noise Ratio ref. 140 watts	>108 dB (20 Hz to 20 kHz)
Dimensions (H x W x D)	140 mm x 321 mm x 240 mm

Quad has a policy of continuous product development and we reserve the right to change products and specifications without notice. O & OE.

ESL-988 Electrostatic Loudspeaker

Maximum Power Output	2N/m ² at 2m on axis
Sensitivity	1.5u bar per volt referred to 1m (86dB/2.83V RMS)
Impedance	8 ohm nominal
Maximum continuous input voltage (RMS) (20 Hz to 20 kHz)	10V Programme peak for undistorted output: 40V Permitted peak input: 55V
Directivity index	125Hz 5.0dB 500Hz 6.4dB 1kHz 7.2dB 8kHz 10.6dB
Axis band limits (low level)	-6dB at 35Hz 3rd order -6dB > 20kHz
AC Input (double insulated)	220-240V or 110-120V See rating details on base of unit
Dimensions (H x W x D)	940mm x 670mm x 315mm (including terminals) (including 185mm base).
Weight	20.5kg net

The right is reserved to alter performance and specification as required. This equipment complies with the radio interference requirements as laid down in EEC regulations.

ESL-989 Electrostatic Loudspeaker

Maximum Power Output	2N/m² at 2m on axis
Sensitivity	1.5u bar per volt referred to 1m (86dB/2.83V RMS)
Impedance	8 ohm nominal
Maximum continuous input voltage (RMS) (20 Hz to 20 kHz)	10V Programme peak for undistorted output: 40V Permitted peak input: 55V
Directivity index	125Hz 5.0dB 500Hz 6.4dB 1kHz 7.2dB 8kHz 10.6dB
Axis band limits (low level)	-6dB at 30Hz 3rd order -6dB > 20kHz
AC Input (double insulated)	220-240V or 110-120V See rating details on base of unit
Power fuse	63mA anti-surge, 200-240V 100mA anti-surge, 100-120V
Power consumption	6W
Dimensions (H x W x D)	1335mm x 670mm x 315mm (including terminals) (including 185mm base).
Weight	25.3kg net

Acknowledgements

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unless otherwise stated.

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