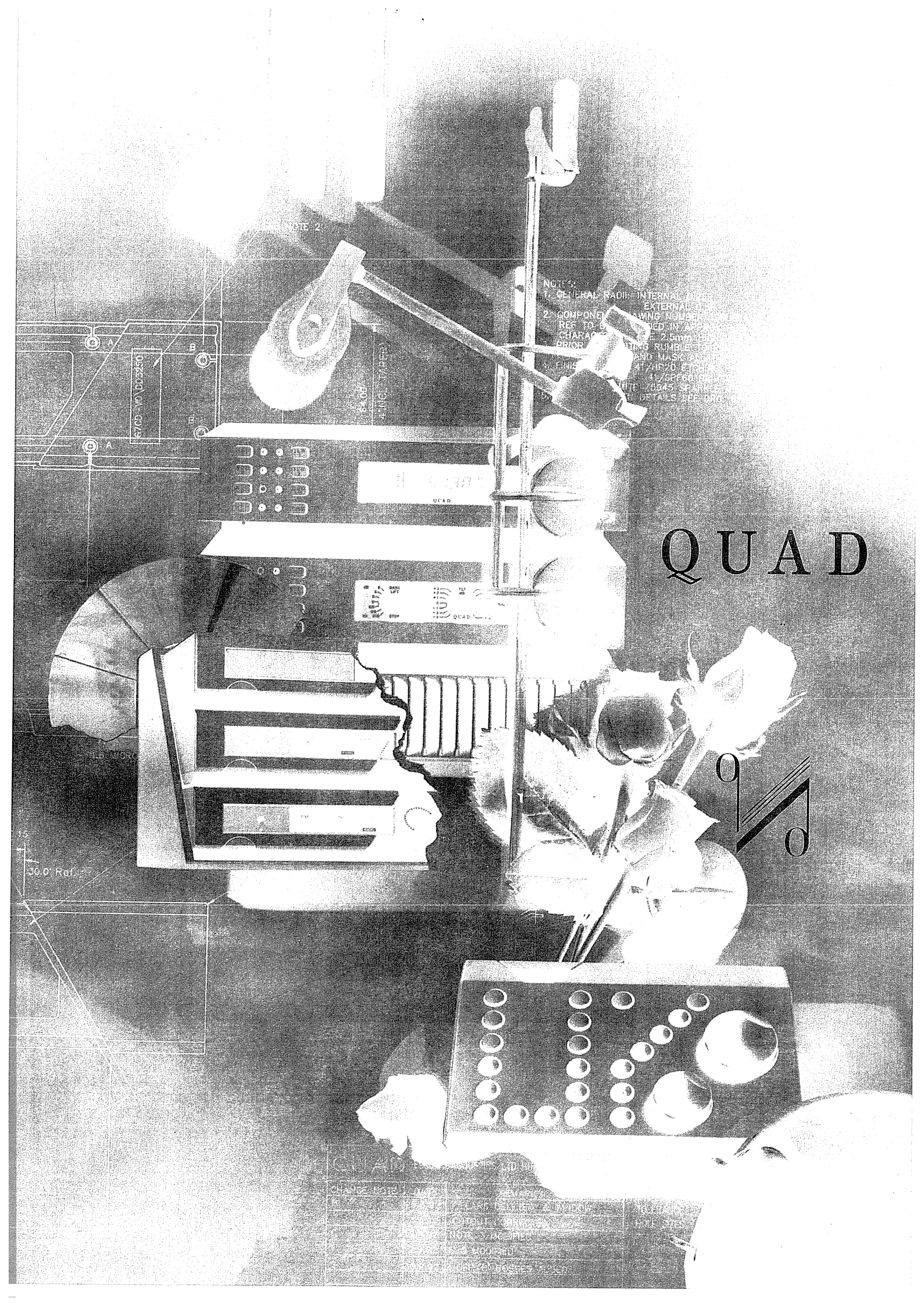
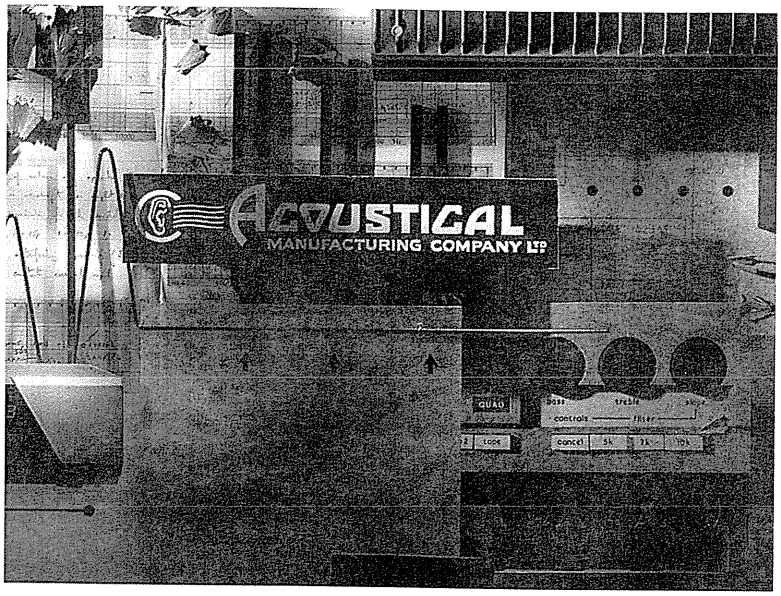

QUAD

Interest in High Fidelity began simultaneously in Britain and the United States in the nineteen thirties. Most of the early developments in electro-acoustics, including the seminal work of C.W. Rice and E.W. Kellog, Harold Black, Alan Blumlein and others, were made by engineers working for large companies involved in telecommunications, wireless and gramophone recording. Budding High Fidelity companies, started by engineers with a passion for music were built upon this foundation of engineering and physics. The energy and enthusiasm of the pioneers brought rapid progress and by the early fifties the performance of the very best equipment had reached standards which are still acceptable today. (Listen to a **Quad** II power amplifier driving a **Quad** ESL to test the validity of this statement). Sadly but inevitably the pioneering companies have either disappeared or been swallowed up by conglomerates and **Quad** is now the only one which remains independent and where engineering still takes precedence over marketing and finance.

Contents

The story of **Quad** started in 1936 when Peter Walker decided to set up his own business making amplifiers under the name of The Acoustical Manufacturing Company.

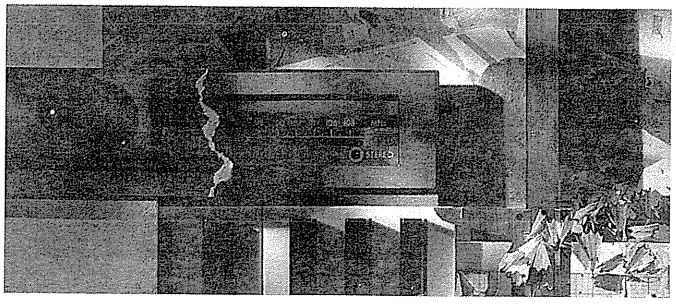


Early days, as in so many small companies, were composed of enthusiasm, hard work, and very little reward, but the experience was invaluable and when, in the late forties, people once again started to take an interest in the quality of music reproduction in the home, Acoustical was already producing high quality amplifiers and loudspeakers. The Corner Ribbon loudspeaker with horn loaded ribbon tweeter reproduced an octave or so which other loudspeakers did not reach and was followed in 1951 by the Acoustical Q.U.A.D. amplifier, successor to the QA/12P which had already found favour with early audio enthusiasts. Music listeners quickly appreciated the virtues of Acoustical's products and realised that the acronym **Quad**, derived from Quality Unit Amplifier Domestic, was much easier to pronounce and remember than Acoustical. The **Quad** amplifier established the idea that a high fidelity system should consist of a separate pre-amplifier and power amplifier with appropriate loudspeakers and programme sources.

Quad's reputation is founded upon the **Quad** II amplifier and **Quad** electrostatic loudspeaker, both introduced in the fifties. As well as establishing the fame and fortune of **Quad**, these products also had a profound effect upon the development of the industry as a whole. It is rare to meet an audio engineer who has not used them at some time as a reference standard against which to compare his own efforts. The principals behind the design of these early **Quad** products; rigourous scientific analysis and the rejection of commonplace solutions in favour of innovative ideas leading to significant improvements in the reproduction of sound; are applied to the design of every **Quad** product.

Succeeding **Quad** products have each made their contribution to the **Quad** reputation, collecting on the way an array of awards and prizes including The Queen's Award for Technological Achievement, the only one ever awarded to an audio equipment manufacturer.

Although designed primarily for music in the home, **Quad** products are used in recording and broadcasting studios and for sound reproduction when and wherever quality is the first requirement.



Choosing a high fidelity system is very difficult. There is a bewildering number of products from which to choose; What Hi-Fi lists a total of more than 30,000,000 possible combinations of compact disc player, amplifier and loudspeaker; and there is no simple way of evaluating their respective merits.

A system can be as simple as a compact disc player, pre-amplifier, power amplifier and loudspeakers, or as complicated as seven programme sources; such as turn-table, tuner, CD player, cassette recorder, laser disc player, Nicam tuner and video recorder; connected to a **Quad** 66 pre-amplifier feeding a cross-over, two power amplifiers and loudspeakers with sub-woofers, so it is important from the outset to have a very clear idea of what you want to achieve. This is determined by the size of the listening room, the types of music you listen to, the programme sources and your budget.

A high fidelity system is only as good as the weakest link in the chain. If you are starting from scratch you have to decide upon your budget and then make sure that you split it correctly.

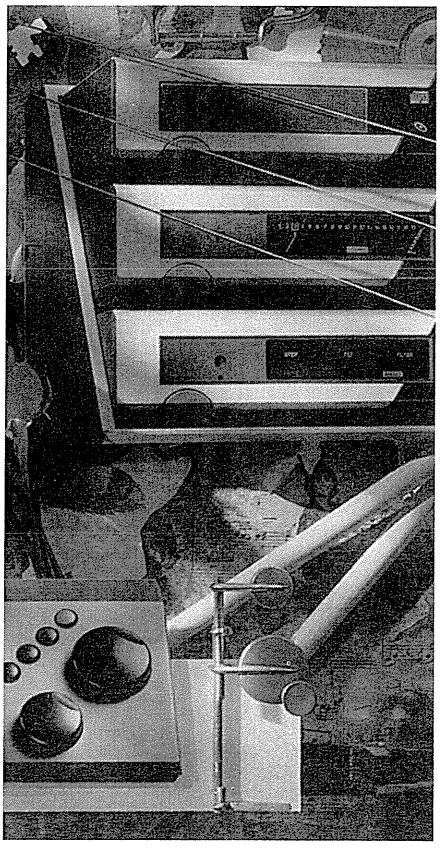
There is no point in having a poor set of loudspeakers driven by a good amplifier or vice versa. If you are upgrading an existing system, spend your money were it makes the biggest improvement. What makes your system unsatisfactory and what is the weakest link? Most probably it will be the loudspeakers. Speakers vary widely in performance, while the difference between most amplifiers is small. If you already have a **Quad** system, it is worth knowing that you can mix and match **Quad** amplifiers, pre-amplifiers and tuners from different generations with good results, so it is relatively easy to add new products step by step to an exisitng **Quad** system and we are always happy to offer advice. The intelligent course to follow when buiding a system is to start with the very best loudspeakers which you can afford and house, follow with an amplifier of appropriate power, then programme sources and finally pre-amplifier. Since the number of programme sources you decide to have has a profound effect upon the allocation of your budget it is best to keep the number to a minimum and spend more on each link in the chain. We think that a Compact Disc player and an FM tuner are essential sources. You are probably confused about DAT, DCC, MD, CD-1 and so forth and the steady stream of articles in both national and specialist press does not help matters. We are confident that Compact Disc is the correct choice for serious collectors of recorded music and that it is unlikely to be displaced for many years to come. There is no point in buying a cassette recorder just to copy cassettes for the car. A CD player for the car need not be expensive and performance is much better. Similarly if you have a modest record collection it makes much more sense to replace them with CDs rather than buy a new turn-table. In Britain the quality of radio broadcasting is so high that a tuner is essential. In general terms the simpler the system the better, but it is easy to incorporate video, laser disc and other sources and it has been known for a customer to reproduce Nintendo sound effects through **Quad** ESL-63s.

Having decided exactly what it is that you want to achieve, you now have to try to choose the right products by using a judicious cocktail mixed from specifications, reviews, the advice of friends, dealer demonstrations and brand reputation, but when the moment finally comes to bring out the cheque book you have to rely upon your own judgement. Specifications are measured under steady state conditions that have little to do with music reproduction and give very little indication of a product's performance when reproducing music. The most useful figures in a specification are the

size and weight, which will tell you whether the equipment will fit on the shelf and whether the shelf will stay on the wall. If you choose products on the basis of measurements alone you will almost certainly be disappointed. Reviews are very subjective so it is not surprising that magazines offer conflicting advice. Choosing products on the strength of reviews alone is like making decisions on the basis of a horoscope. Enthusiastic friends can be helpful but take their advice with a pinch of salt. All too often they just quote inaccurately from the last magazine they saw. Good retailers are hard to find but are worth seeking out. They will provide unbiased advice and the opportunity to listen to equipment in quiet and relaxed surroundings. Before you visit the dealer make sure that you write down exactly what you want to achieve, in terms of the types of music, the programme sources, the size of your listening room and of course your budget. The dealer can then show you products which match your requirements and demonstrate them.The aim of a good high fidelity system is to recreate the total experience of a live music event, so it is obvious that the only way to judge a system is to compare it with the real thing. Take your own records or compact discs, ideally of music which you have recently heard live. The volume control of a good high fidelity system acts as a focus control and with a proper stereo recording played at the correct volume level should produce a clearly focused and totally convincing acoustic picture of the performers in their acoustic space. If the volume control simply makes the music louder or quieter, then either the system or the recording or both are wrong. Do not place too much reliance upon direct comparison between products. Unless done with great care and scientific accuracy, A/B comparison tests are very misleading. Many a buyer has found to his cost that the qualities which made the product sound impressive in a short comparative demonstration in the shop quickly became irritating and tiring when listened to at home. Ignore the naive and commonplace nostrums about tapping your feet to the bass line while singing along to the tune, unless you want to end up with a Walkman or something that sounds like one.

Once you have found something which comes up to your expectations you can ask for a home demonstration. If you are a serious buyer, the dealer will be happy to arrange for this and it is essential to try loudspeakers such as the **Quad** ESL 63 in your own listening room.

It is worthwhile to invest as much time as you possibly can as well as money in your search. Good equipment will last for many years and since technological revolutions do not occur every day, despite the efforts of creative copywriters to persuade us otherwise, its performance is unlikely to be surpassed for some time. Many **Quad** customers are enjoying music reproduced on equipment designed forty years ago, which still easily out performs the vast majority of equipment on sale today.



Once you have made the right decisions all the effort will quickly seem worthwhile.

The two **Quad** pre-amplifiers provide contrasts in style, but not performance. The **Quad** 66 offers remote control and a total of seven inputs, while the 34 has four inputs. Which you choose depends largely upon how you want to operate your system.

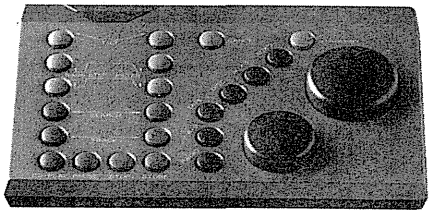
Quad 66 pre-amplifier and control panel

The **Quad** 66 remote control system is the perfect antidote to the complexity of modern life, giving access to music at the touch of a button, with performance limited only by the quality of the recording or broadcast. The design of the Remote Control Panel is a masterpiece of logical simplicity. The sensibly large push buttons are grouped by functions, while volume and balance are adjusted by rotary knobs. The panel controls all functions of the **Quad** 66 pre-amplifier, **Quad** 66 FM tuner and **Quad** 67 Compact Disc player.

Operation is immediately obvious and once the equipment has been connected up it should not be necessary to look at the instruction book again, a refreshing change from other remote control systems. The Compact Disc controls are kept to the essential minimum and also double up as preset selectors for the **Quad** 66 FM tuner.

In apparent contradiction to the aim of simplicity, seven buttons on the Control Panel operate the **Quad** tone controls. **Quad** tone controls are quite unlike those found on other equipment. Conventional treble and bass controls have a poor reputation. They serve no useful purpose and are often badly executed. The **Quad** tone controls, on the other hand, serve a very useful function by making many an indifferent recording sound more realistic. They are an essential tool for every collector of recordings. The logic of the **Quad** tone controls is very easy to appreciate when they are within hands reach on the remote Control Panel. The recording sounds over bright? Press the tilt button and it sounds just right. It is all so simple and quite addictive. The Control Panel can be used anywhere in the listening room and does not have to be pointed at the pre-amplifier.

The **Quad** 66 pre-amplifier has seven inputs and virtually any programme source can be connected to it. The disc input can be adjusted to match virtually any pick up cartridge by means of plug in boards. Two of the inputs are specially designed to prevent hum which is often encountered when the sound output from a television set or video recorder is connected to a high fidelity system, a typically thoughtful piece of **Quad** engineering design. Performance is very much in the **Quad** mould, as accurate as it is possible to be, the output audible indistinguishable from the input, except when the tone controls are in use.



Quad 66 Pre-amplifier

Distortion	Worst case, any input 0.05%
Residual noise	'A' weighted. Volume control at minimum -105dB
Frequency response	Disc RIAA ±0.5dB from 30Hz - 20kHz All other inputs ±0.2dB from 15Hz - 20kHz
Inter channel balance	±0.5dB volume control settings max to -60dB
Filters, Bass Step and Tilt (+3 to -3)	See graphs
Mains voltage	110-120V or 220-240V, 50-60Hz; 6W
Weight	3.3kg
Dimensions (plus connectors)	321mm wide; 80mm high; 255mm deep approx.

Inputs

From	Disc	CD	Radio	A-V/Aux 1	Aux 2/Tape
Input Sensitivity	3mV*	300mV	100mV	300mV (anti-hum)	300mV
Load Impedance	47kΩ / 220pF	100kΩ	100kΩ	33kΩ	33kΩ
Signal/Noise volume max	75dB	99dB	93dB	93dB	99dB
Signal/Noise typical volume setting	90dB	105dB	104dB	104dB	105dB

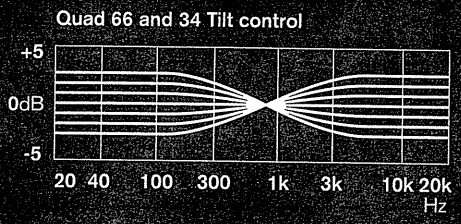
(Noise figures 'A' weighted ref. 500mV)

Outputs

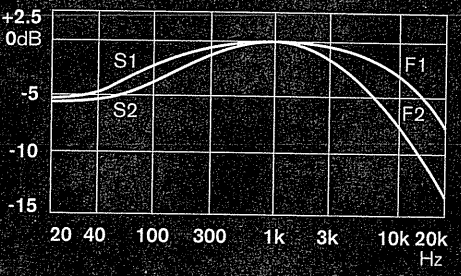
To	Power Amplifier	Tape/Aux 2
Output level	500mV (1.5 V max)	300mV
Source impedance	940Ω	3k3Ω

*other options with sensitivities of 100μV, 200μV, 400μV, 1mV and 300mV are available.

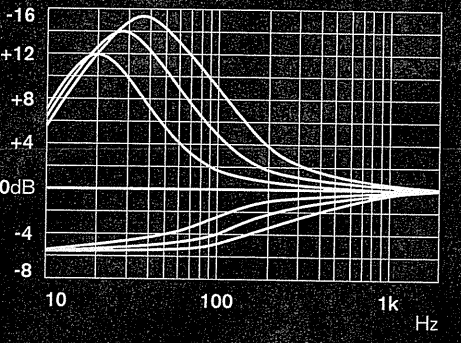
Quad 34 control unit



Quad 66 and 34 Tilt control



Quad 66 Bass step and filter



Quad 34 Bass control lift and step

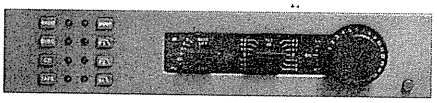
The Quad 34 is a control unit very much in the mould of its predecessors the **Quad** 33 and **Quad** 22. The refinements in circuit design and ergonomics provide the maximum musical enjoyment from Disc, Radio, Tape and Compact Disc.

Controls are laid out in a logical and consistent manner so that the function of each is self evident. Solid state switching provides the right feel and avoids the long term reliability problems inherent in mechanical switches.

Attention to detail extends to every aspect of engineering design and manufacture, from the clever volume control circuit, which gives optimum signal to noise at normal settings, to the finish of the front panel which is achieved by hand rubbing down between coats of paint.

The **Quad** 34 incorporates the **Quad** tone controls, so misunderstood by hi-fi purists who believe that "flat" is the only way to be, but so appreciated by music listeners who want their recordings to sound as realistic as possible. The Tilt, Filter and Bass Step operate like those on the **Quad** 66 and solve certain problems of recordings and rooms. The Bass Lift can be used to extend the low frequency response of small loudspeakers, so that performance does not have to be sacrificed when small loudspeakers are used for reasons of space or economy.

The **Quad** 34 can be used with both the **Quad** 306 and the **Quad** 606 Power Amplifiers and makes the ideal foundation for a simple, affordable music system of the highest quality.



Quad 34 Control Unit

Distortion	Worst case, any input 0.05%
Residual noise	'A' weighted. Volume control at minimum -105dB
Frequency response	Any input except Disc ±0.3dB Disc RIAA ±0.5dB (both at 30Hz-20kHz)
Tilt and Bass	See curves
Filters	See curves
Inter channel balance	±0.5dB with volume control varied from maximum to -60dB
Mains voltage	110-120V or 220-240V, 50-60Hz; 7W
Weight	3.2kg
Dimensions	321mm wide; 70mm high; 207mm deep

All voltages quoted are rms

Inputs

From	Disc	CD	Radio	Tape
Input sensitivity	3mV*	300mV**	100mV	300mV**
Load Impedance	47kΩ /220pF	57kΩ	100kΩ	57kΩ
Signal/Noise	75dB	87dB	88dB	87dB

(Noise figures 'A' weighted ref. 500mV)

Outputs

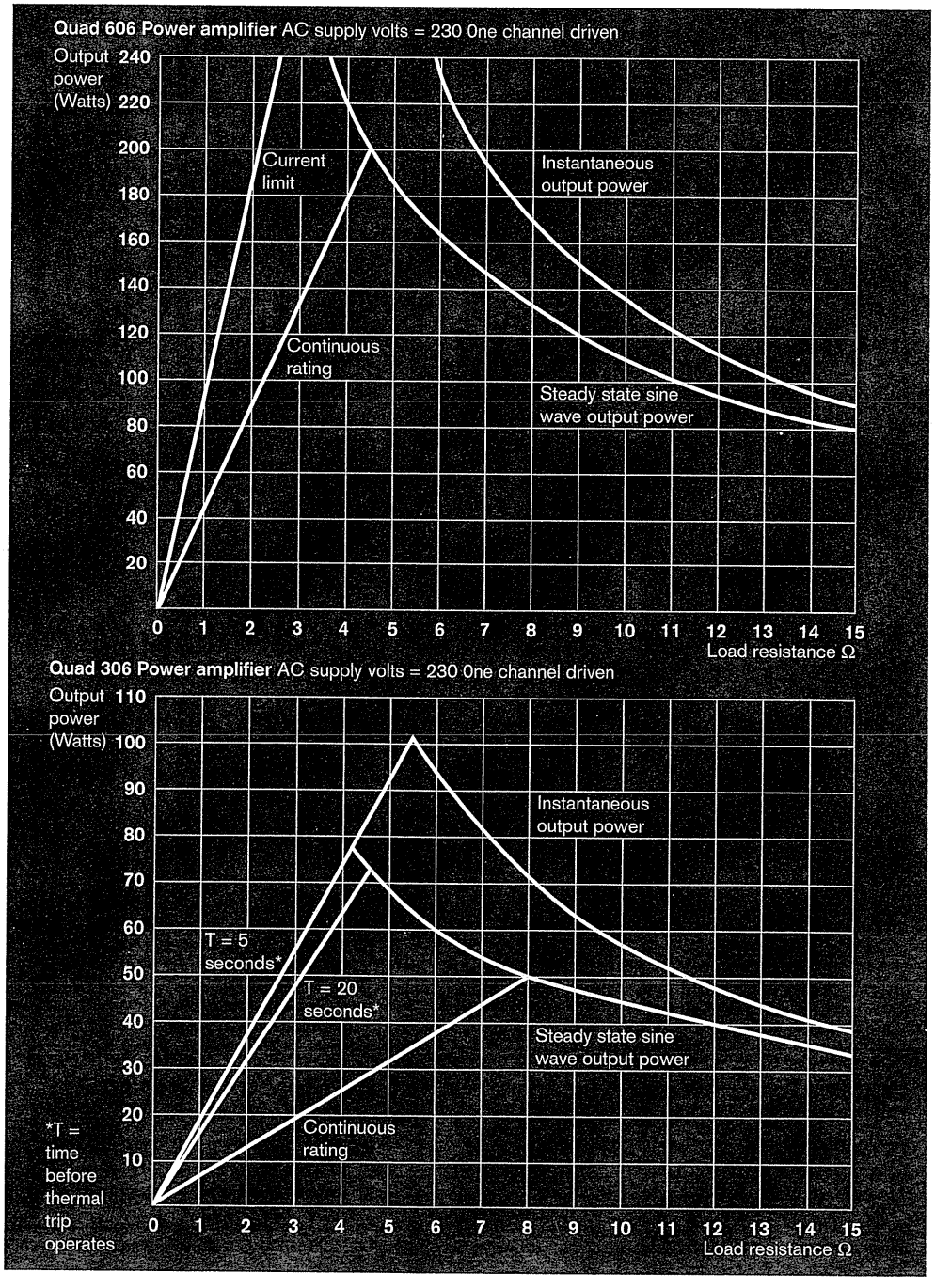
To	Power Amplifier	Tape
Output level	500mV	300mV**
Source impedance	830Ω	2K2Ω

*Others available with sensitivities of 100μV, 200μV, 400μV, 1mV and 10mV
**Others available with sensitivities of 100mV and 500mV

The **Quad** 306 and 606 power amplifiers use a special type of feed forward error correction circuit, which was developed and patented by **Quad** in 1975 and christened "Current Dumping". The circuit technique has been used in all subsequent **Quad** amplifier designs and by a number of other manufacturers under a variety of guises. Current dumping is still the most effective circuit technique for high quality power amplifiers[1]. Reduced to it simplest elements, the performance of the amplifier is determined solely by the performance of a very high quality error correction amplifier and four passive components arranged in a bridge. The circuit is self-compensating so that performance is not altered by the ageing of components.

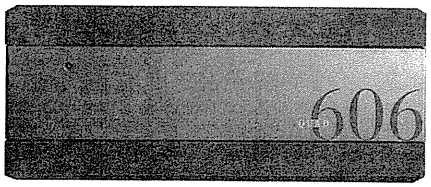
The **Quad** 306 and 606 Power Amplifiers use identical circuit designs and the only difference between them is their power output.

The **Quad** 306 gives adequate power for the vast majority of domestic systems, while the **Quad** 606 provides enough power for the largest and most demanding systems. Either amplifier can be used with the **Quad** ESL-63. The **Quad** 306 can be used with the original ESL when the protection circuits are fitted to the speakers.



1 "Distortion reduction in frequency-dependent feedback-feedforward amplifiers," by N.M. Allinson & J. Wellingham, published by the International Journal of Electronics 1985, volume 59, No.6,667-683.

Quad 606 Power Amplifier



Measurements apply to either channel. All measurements made at 230Vac

Power output	See graph
Distortion	Continuous sine wave into 8Ω resistive load 20Hz any level up to 130W <0.01%Dtot 1kHz any level up to 130W <0.01%Dtot 20kHz any level up to 130W <0.03%Dtot
Output internal impedance and offset	1.5µH in series with 0.05Ω Offset typically 7mV
Frequency response	Ref. 1kHz -0.25dB at 20Hz and 20kHz -1.0dB at 13Hz and 40kHz
Power response	Ref. 1kHz -0.25dB at 20Hz and 20kHz
Signal input level	0.5 volts for 140W into 8Ω Amplifier loads the input by 20kΩ
Signal input overload	Instantaneous recovery up to +15dB overload
Cross-talk	Input loaded by 1kΩ - 100dB at 100Hz - 85dB at 1kHz - 65dB at 10kHz
Hum and Noise	(15.7kHz measurement band-width) Un-weighted -105dB ref. 140W
Stability	Unconditionally stable with any load and any signal.
AC input	110-120V or 220-240V, 35-750W, depending on signal level
Weight	12.0kg
Dimensions	321mm wide; 140mm high; 235mm deep

Quad 306 Power Amplifier

Measurements apply to either channel. All measurements made at 230Vac

Power Output	See graph
Distortion	Continuous sine wave into 8Ω resistive load 20Hz any level up to 50W <0.01% Dtot 1kHz any level up to 50W <0.01% Dtot 20kHz any level up to 50W <0.03% Dtot
Output internal impedance and offset	1.5µH in series with 0.05Ω Offset typically 7mV
Frequency response	Ref. 1kHz -0.25dB at 20Hz and 20kHz -1.0dB at 13Hz and 40kHz
Power response	Ref. 1kHz -0.25dB at 20Hz and 20kHz
Signal input level	0.375V for 50W into 8Ω Amplifier loads the input by 20kΩ
Signal input overload	Instantaneous recovery up to +15dB overload
Cross-talk	Input loaded by 1kΩ - 100dB at 100Hz - 85dB at 1kHz - 65dB at 10kHz
Hum and noise	(15.7kHz measurement band-width) Unweighted -105dB ref. 50W
Stability	Unconditionally stable with any load and any signal
AC input	110-120V or 220-240V, 30-250W, depending on signal level
Weight	4.6kg
Dimensions	321mm wide; 70mm high; 207mm deep

Quad 67 Compact Disc player.

The **Quad** 67 Compact Disc player is controlled either from the **Quad** 66 remote control panel or the small hand set which is supplied with it. The design brief for the 67 was to use the very best of current technology to produce a player with totally neutral and transparent performance.

"When I can have the luxury of sitting down to enjoy a whole work I should choose the 67 CD every time, it would be the natural thing to do"
Geoffrey Horn in Gramophone May 1993.

"Through the **Quad** 67 nothing was hidden"
Eric Braithwaite in Hi-Fi World May1993

"The **Quad** 67 does not attempt to shock you into attention with dramatic exposures or temperous outbursts, instead it responds to the music in an utterly natural way and with admirable consistency."
Peter Comeau in Hi-Fi News April1993

The **Quad** 67 Compact Disc player uses the Philips CDM 9 engine and a Delta Sigma modulation decoder to provide a player which has a measured performance very close to the theoretical optimum and with a very high tolerance of damaged or faulty discs. The CDM 9 engine is extremely well engineered and produces a very low error output even with badly marked or out of specification discs. It is very quiet in operation.

Delta Sigma modulation is a variation on Bit-stream technology. The chief advantage of the Delta Sigma chip is that the accuracy of conversion is not dependant upon the accuracy of the master clock and is thus not susceptible to clock jitter, which makes the task of the design engineer somewhat easier. However with digital technology it is not the terminology which matters as much as the quality of the engineering and we are confident that the 67 is a true **Quad** product.

Quad 67 Compact Disc Player

Frequency response	<±0.1dB 20-20,000Hz
Phase linearity	<±0.5° 20-20,000Hz
Signal/noise ratio	>100dB 20-20,000Hz
Cross-talk	>100dB at 1kHz
Total harmonic distortion	<0.002% at 1kHz
Wow and flutter	below measurement levels
D/A conversion	18 bit 64 x oversampling Delta - Sigma convertor
Audio output	2V rms max. 300mV on normal programme material. Minimum load impedance 10kΩ
Optical read-out system	laser semi-conductor AlGaAs wavelength 800nm
Sampling frequency	44.1kHz
Digital output	for digital signal processors
Remote control interface	RC-5 system
AC input	110-120V or 220-240V, 50-60Hz; 14W
Dimensions	width 321mm; height 80mm; depth 240mm approx. drawer opens by 145mm approx.
Weight	3.5kg

FM radio transmissions provide the very highest quality programme material. **Quad** has two tuners, the 66 and the FM4. Each is designed to be used with the appropriate control unit. There is no technical reason why the 66 should not be used with the 34, but you will find it very frustrating to use a remote control tuner with a manual pre-amplifier. Each time that you change stations you have to get up and adjust the volume control because stations use different modulation levels. Similarly there is no technical reason why the 66 pre-amplifier and the FM4 should not be used together, but it is frustrating not to be able to change stations from the remote control panel.

Quad 66FM tuner

The **Quad** 66FM tuner is designed as part of the **Quad** 66 system and shares the 66 philosophy of superb performance combined with simplicity of operation. The **Quad** 66 tuner is designed to take advantage of the 66 remote control system and is not intended to be used with the **Quad** 34, 44 or earlier pre-amplifiers for which the FM4 is still the ideal match. When the "Radio" button on the 66 remote control panel is pressed the "Track" and "Search" buttons operate the tuner. Once stations have been loaded into the tuner's memory using the Track, Search and Store buttons, the "Track" button is used to move from one preset station to another.

Many tuners use an "off-the-shelf" front end. **Quad** has designed the 66FM from aerial input to audio signal output to ensure that performance is limited only by the quality of the incoming broadcast.

Physically the tuner is identical to the **Quad** 66 pre-amplifier. The display shows preset "track" number and tuned frequency and "track" numbers are repeated on an "analogue" display, since for most of us it is easier to remember where a particular station is stored rather than just a number.

Nineteen preset stations are rather more than the majority of users will require. Even in countries where there are nineteen or more available transmissions to fill the slots, it is unlikely that anyone will wish to listen to all of them, particularly given the tendency of broadcasters to rely increasingly upon compressed pop music to fill up air time. Thus there is plenty of room to store stations so that they are easy to find. The nineteen presets and "analogue" display can be used in a multitude of ways. Stations can be stored in frequency order, but for many users it will make more sense to store the main news programme in position number 1 which can always be reached by pressing "STOP" on the Remote Control panel, then store other stations in some convenient way.

Quad 66FM tuner

Tuning Range	88 - 108 MHz
Channel spacing	25kHz (50kHz displayed)
Sensitivity	
(30dB quieting)	Mono 1µV (1.2dBf)
(50dB quieting)	Mono 2.7µV (8dBf)
	Stereo 25 µV (28dBf)
Full limiting	<1µV (<1.2dBf)
Signal/noise	
(input signal 1kHz at 1mV, 'A' weighted)	Mono 76dB
	Stereo 70dB
Distortion	
(at 1kHz ±75kHz deviation)	Mono 0.15%
	Stereo 0.15%
(at 1kHz±25kHz deviation)	Mono 0.05%
	Stereo 0.1%
Capture ratio	1.5dB
IF rejection	100dB
AM suppression	60dB
Image rejection	80dB
Pilot tone suppression	60dB
Cross-talk	-40dB (nominal at 1kHz)
Frequency response	+0 -1dB, 20Hz- 15kHz
Output level (at 30% modulation)	100mV
Source impedance	1kΩ
Minimum load impedance	47kΩ
De-emphasis	50µS or 75µS
Aerial input	75Ω unbalanced
AC input	110-120V or 220-240V, 50-60Hz; 6W
Dimensions	width 321mm; height 80mm;
	depth 255mm (plus connectors) approx
Weight	2.8kg

Quad FM4 tuner

The **Quad** FM4 provides access to the listener's choice of programme at the touch of a button, with performance limited only by the quality of the incoming signal. Broadcasting organisations in several countries use the **Quad** FM4 to monitor the quality of their transmissions.

Good ergonomics and advanced electronics are combined to produce a tuner which performs well and is easy to use.

With a signal of adequate strength, the **Quad** FM4 provides absolutely faithful reproduction of the original transmission.

Operation of the **Quad** FM4 is controlled by a specially developed microprocessor which makes all essential decisions. Once the presets have been programmed, in itself a simple task, all the listener has to do is decide which station to listen to and press the appropriate button. Stations remain stored in the tuner memory almost indefinitely provided that the tuner is used once in a while, and for up to five years even when disconnected from the mains. When switched on the tuner always selects the station which was used last.

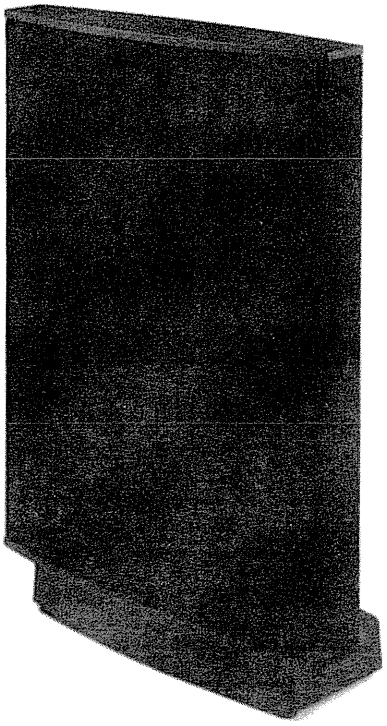
Quad FM4 Tuner

Frequency range	88-108MHz	
Sensitivity	30dB quieting	Mono 1µV (1.2dBf)
	50dB quieting	Mono 2.7µV V(8dBf
		Stereo 25µV (28dBf)
Full limiting	<1µV (<1.2dBf)	
Signal/Noise ('A' weighted)	Input signal 1mV	Mono 76dB
		Stereo 70dB
Distortion	1kHz ±75kHz	Mono 0.15%
		Stereo 0.15%
	1kHz ±25kHz	Mono 0.05%
		Stereo 0.10%
Selectivity	53dB	
Capture ratio	1.5dB	
IF rejection	100dB	
AM suppression	60dB	
Image rejection	80dB	
Pilot tone suppression	60dB	
Cross-talk at 1kHz	40dB	
Frequency response	20Hz - 15kHz: +0-1dB	
Output level 30% modulation	100mV	
Source impedance	100Ω	
Recommended load impedance	>20kΩ	
Aerial input	75Ω unbalanced	
De-emphasis	50µsec or 75µsec	
AC input	110-120V or 220-240V, 50-60Hz; 7W	
Weight	3kg	
Dimensions	321mm wide; 70mm high; 207mm deep	

Quad ESL 63 loudspeaker

The **Quad** ESL 63 is affectionately known as "FRED" which is the acronym of Full Range Electrostatic Doublet. Just over thirty years ago, **Quad** launched the world's first full range electrostatic loudspeaker, which set the standard for the world's loudspeaker designers for the next quarter of a century. FRED now carries on the role of reference and is found wherever quality of music reproduction is the main requirement. Many of the leading record companies use FREDs as recording monitors and to check the quality of edited tapes.

Electrostatic loudspeakers have inherent performance advantages over conventional loudspeakers. An electrostatic loudspeaker consists of a very thin plastic membrane suspended between a pair of conducting perforated plates. The membrane carries an electrostatic charge and is forced to move by the electrostatic field produced between the plates when the signal voltage is placed across them. The membrane is very light (in the ESL 63 its thickness is one tenth that of a human hair) and hence has negligible stored energy. Since the electrostatic charge is spread uniformly over the surface of the membrane it can be made as large as required and a cabinet is not necessary. Thus the two major causes of colouration in moving coil loudspeakers, which we have come to regard as the sound of hi-fi, are avoided in electrostatic loudspeakers. The performance of an electrostatic loudspeaker is a revelation to anybody accustomed to listening to music through conventional moving coil loudspeakers.



The **Quad** ESL 63 takes the performance advantages of electrostatic loudspeakers a stage further. The ideal loudspeaker for stereo reproduction is a single point source reproducing all frequencies and loudspeaker engineers have been trying to find a practical solution for more than half a century. If it is not possible to produce a point source loudspeaker, can we instead make a loudspeaker which to an observer behaves like a point source loudspeaker?

Imagine a theoretically ideal point source loudspeaker radiating sound pressure waves and then imagine a plane in the air a short distance from the source and at right angles to the direction of propagation. If the air at the plane is made visible in some magical way, we will see concentric waves radiating out from the centre just as they do when a stone is thrown into a still pool. If we substitute an electrostatic loudspeaker membrane for the plane in the air, make it move in exactly the same way as the air on our imaginary plane and suppress the imaginary source, the results to an observer positioned on the far side will

be identical to those from the ideal source.

The **Quad** ESL 63 does exactly this. An ingenious arrangement of concentric electrodes fed by a sequential delay line produces a sound pressure pattern which is an exact replica of that from an ideal source placed 30cms behind the plane of the diaphragm. The ESL 63 is a totally homogeneous sound source, phase true and aperiodic, with a frequency response, both on and off axis, quite free from the irregularities which are inevitable with any multi-way loudspeaker system. The **Quad** ESL-63 has a very well controlled directivity characteristic with the result that there is no stereo hot spot. A pair of 63s will produce an excellent stereo image over a range of listening positions which is as wide as the speakers are apart. Since the loudspeakers can be placed right up to the side walls the stereo stage can be very wide and the listening position very free. With the very best stereo recordings the results are holographic and moving from one side to the other presents the orchestra from different points of view.

The net result is a loudspeaker of unsurpassed accuracy, which with the right programme material will produce a more realistic and satisfactory illusion of a live musical performance than has been possible before. Compact disc provides music at home which is identical to that on the studio master tape. A number of the leading record companies use the **Quad** ESL 63 as a reference monitor so that listening to compact disc at home using **Quad** ESL 63s is akin to listening over the recording engineers' shoulder. There will be moments when you wish that you could reach out and adjust the controls and with the **Quad** 66 Control Panel you can.

Quad ESL 63 Specification

Impedance	8Ω nominal
Sensitivity	1.5μ bars per volt referred to 1m (i.e. 86dB/2.83V rms)
Maximum input	Continuous input voltage 10Vrms Programme peak for undistorted output 40V Permitted peak input 55V
Maximum output	$2N/m^2$ at 2m on Axis
Directivity index	125Hz 5dB, 500Hz 6.4dB, 2kHz 7.2dB, 8kHz 10.6dB.
Axis band limits	(Low level) -6dB at 35Hz 3rd order - 6dB>20kHz
AC input	110-220V or 220-240V, 50-60Hz; 5W
Weight	18.7kg.
Dimensions	660mm wide; 925mm high; 270mm deep including 150mm base

Sub-woofers

If the ESL-63 is so good why is a sub-woofer a good idea? Some customers want to play just a little bit louder and some, particularly organ enthusiasts, want to reproduce lower frequencies. It is not difficult to design an electrostatic loud speaker to do this but it would be rather big and very expensive, so a sub-woofer is a practical compromise. The two sub-woofers for the original ESL and the ESL-63 are designed and manufactured by Gradient in Finland. They are both dipoles to match the directivity characteristic of the electrostatic loudspeakers and ensure that the cross-over from ESL to sub-woofer is inaudible. Only a few dealers stock and demonstrate the sub-woofers. We will be pleased to send you further information and a list of dealers. You will be surprised how few recordings have very low frequencies to demonstrate the advantages of a sub-woofer, so you may have to brace yourself for the 1812 and similar old war-horses. The sub- woofers fit neatly under the electrostatic loudspeakers and double as stands. They come complete with a cross-over, but do need a second amplifier.

Cables

Although the High Fidelity industry was firmly founded on science and engineering, there has been a steady shift in recent years towards a Lewis Carroll world where everything is topsy turvey, science is rejected, common sense is thrown out of the window and the Jabberwock of subjectivism whiffles through the tulgey wood. Nowhere is this more true than in the field of cables.

Quad has designed two loudspeaker cables based on good old fashioned Ohms Law, which transfer the voltage at the output terminals of the power amplifier to the input terminals of the loudspeaker in a totally predictable manner. These cables provide a cost effective and properly engineered solution. 4mm connectors of appropriate quality will be available later this year.

Specification of QLSCF2 cable, Flat.

A cable for use between low power amplifiers and their associated loudspeakers. The cable has a flat profile. The coating is tough, scuff resistant and flexible.

conductor

conductor sq area	2.5 sq mm, nominal overall
stranding	80 strands of 0.2mm diameter
lay	braid flattened to a rectangular profile approx 4.3 x 1.05 mm

electrical properties

capacitance	90pF/m, nominal calculated value
inductance	850nH/m, nominal calculated value
resistance	15mΩ/m, nominal calculated value
size	11.85mm x 2.5mm overall +/-5%

Specification of QLSCR4 cable, Round.

A cable for use between power amplifiers and their associated loudspeaker loads. The cable has an overall round profile which contains two individually insulated conductors. The jacket skin is tough, scuff resistant and flexible and is applied over a flexible bedding. The insulation meets the voltage stresses which can be experienced by using power amplifiers capable of providing 3kW into 8 Ohm loads.

conductor

conductor sq area	3.96sq mm, nominal overall
stranding	126X0.2mm
lay	7x18 rope lay, round

electrical properties

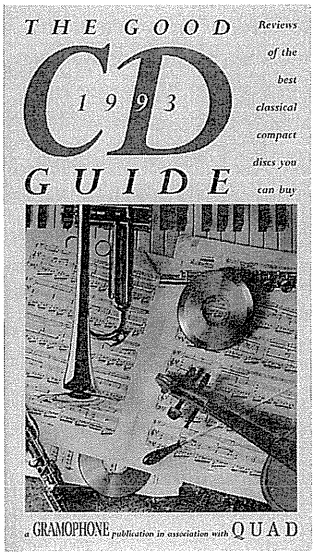
capacitance	157pF/m, nominal calculated value
inductance	570nH/m, nominal calculated value
resistance	8.6mΩ/m, nominal calculated value
size	12.5mm dia +/-5%, nominal

Racks and stands

The back view of the average high fidelity system looks like like a picador's horse after an unfortunate encounter with the bull. The **Quad** racks hide this visceral mess. There is one for the 34, FM4 and 306 and one for the 66, 67 CD player and 66FM tuner. The racks can stand on a convient shelf or cabinet or the **Quad** pedestal.

Quad and The Gramophone Good CD Guide

Quad sponsors the Good CD Guide each year partly because we like it, but mainly because we think that it is a publication which our customers will enjoy. The reviews, by members of the Gramophone review team, are authoritative, informative and entertaining. Inevitably you will disagree with some of the recommendations, but with more than 2,000 of them it would be more surprising if you did not. The Good CD Guide provides an essential short cut through The Classical Catalogue.



Quad and Isis Records

Quad is sponsoring a series of recordings of historic key board instruments which have not been recorded before. Isis records have released the first three in the series. Martin Souter is unusual in that he has a successful international career as both an organist and harpsichordist. On the first disc he plays the music of Handel and Scarlatti on a two manual harpsichord made by Kirckman in 1772. On the second he plays Bach on a fine organ built by Garrels in the Grote Kerk, Maasluis, Holland and on the third he plays five Handel suites on the harpsichord which Handel played when he composed them. We know this because there is a contemporary portrait of Handel leaning on the instrument, painted by Philip Mercier. The recordings are made by Geoffrey Horn, of Gramophone fame, using a simple stereo pair with the absolute minimum of editing and provide a faithful recreation of the original. Future plans include music by Purcell on the oldest two manual harpsichord in England, built by Tisseran in 1700 and early English music played on the organ of Knole Castle. Built in 1620, the oldest working keyboard instrument in Britain. The Kirckman harpsichord can be seen in the Ashmolean Museum in Oxford and the Tisseran and Smith (Handel's) harpsichords can be seen in the Music Faculty, where they form part of the Bate Collection. Other instruments from the Bate Collection will be recorded in due course, building up a fascinating archive of keyboard music.

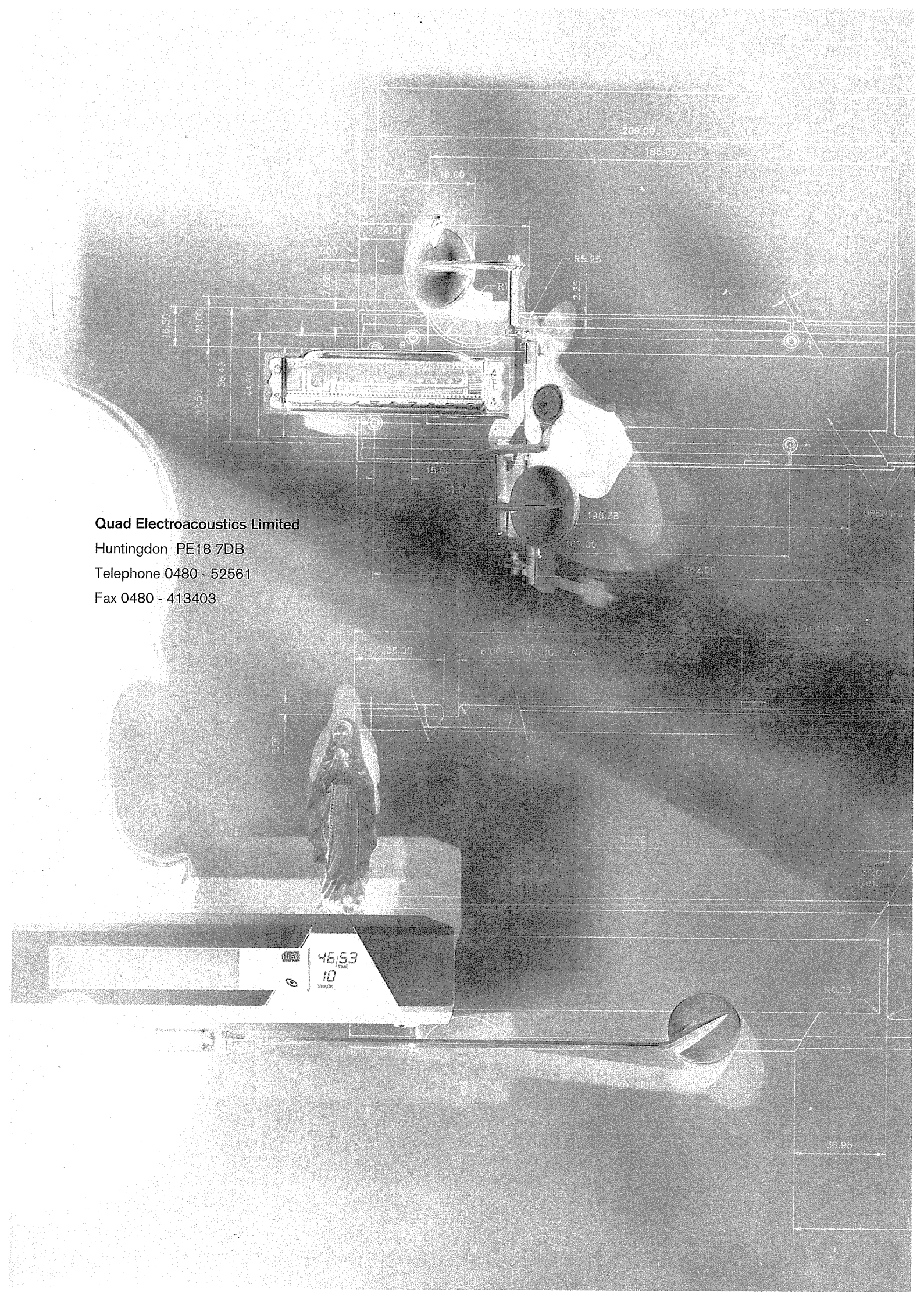
Quad and Lyrita

We are planning to release a compact disc in conjunction with Lyrita in September. This will consist of music by British composers. Although pot-pourris can be unsatisfactory, we are confident that this exploration of British music will provide a stimulating introduction to the work of some less well known composers and the quality of Lyrita recording is legendary.

Quad and Opus 3

Opus 3 is a Swedish record company which is famous for the realism of its recordings. High Fidelity companies regularly use Opus 3 recordings for demonstration and we used one for the launch of the ESL-63. We will be issuing a CD, compiled from the best Opus 3 recordings, in September.

Isis, Lyrita and Opus 3 all use **Quad** amplifiers and ESL-63 to monitor their recordings, something which they have in common with a large number of other record companies.



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