



Q U A D

ESL-988 & ESL-989 Electrostatic Loudspeakers Instruction Manual



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IMPORTANT NOTES

European Union Directives

Quad equipment is designed to comply with the legal provisions of EU Directives 89/336/EC and 72/23/EEC. The standards which have been applied were those in force at the time of the introduction of the product.

The product bears the CE mark:



Compliance cannot guarantee perfect performance. In the very rare circumstance that you experience problems you should first try to locate and remedy the origin of any disturbance. A further option is to relocate the Quad equipment in order to reduce the interference. Your dealer should be able to provide assistance if the problem persists.

FCC Rule 15 Class B

This equipment has been tested and complies with the limits for a Class B device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Re-orient or relocate the receiving antenna
- Increase the separation between the equipment and the receiver
- Connect the equipment into an outlet on a mains circuit different to that to which the receiver is attached
- Consult the dealer or an experienced radio/TV technician for help

This Class B apparatus meets all the requirements of the Canadian Interference Causing Equipment Regulations.

Information to the user

Alteration or modifications carried out without appropriate authorisation may invalidate the user's right to operate the equipment.

It is always good practice to switch off equipment before connecting or disconnecting signal leads. This will prevent unpleasant and loud noises coming from the loudspeakers and avoid the risk of damage to equipment.

This equipment is double insulated and does not need a safety earth. It is important, though, that any equipment connected to it is earthed according to the manufacturers' instructions. This becomes more important as the number of units which are connected together increases.

Noise Pollution

Please be aware that very high sound pressure levels can cause permanent damage to your hearing and also severe annoyance to neighbours.



INTRODUCTION

The Quad ESL loudspeaker is a full range electrostatic loudspeaker doublet. It consists of a very light electrically polarised diaphragm suspended between two sets of concentric annular electrodes. Signal is fed to the electrodes via sequential delay lines causing the diaphragm to move and the motion of the diaphragm produces a sound pressure pattern which is an exact replica of that from an ideal source placed some 30cm behind the plane of the loudspeaker diaphragm.

WARNING: The Quad ESL loudspeaker has very high internal voltages. No attempt should be made to remove the protective grilles or the baseplate. Amplifiers which are not short circuit protected may be damaged by the protection circuits in this loudspeaker and should not be used with the Quad ESL.

PACKING LIST AND UNPACKING THE EQUIPMENT

The packaging contains the following items:

- The Quad ESL loudspeaker
- AC power lead 3m with 13A 3 pin plug (3A fuse), QUKES23 (UK only)
- Instruction Manual
- Warranty Registration Form
- One set of packing materials comprising:
 - One set of packing pieces
 - One cardboard carton
 - One polythene protective bag

Consult the dealer from whom you purchased the equipment if any of these items is not present.

The Quad ESL loudspeaker is completely assembled. To remove it from the packing, spread out the flaps from the open end of the cardboard carton and then invert the complete pack on to the floor, taking care not to let the contents slide out. Lift off the cardboard carton.

Please retain the packing materials for future use or return them to your dealer. If you decide not to keep the packing, please dispose of it sensibly. The paper and plastics components are recoverable and may be taken to an appropriate recovery service.

Please retain the user manual and the information concerning the date and place of purchase of this equipment for future reference.



GUARANTEE AND PRODUCT REGISTRATION

Your Quad equipment is guaranteed against any defect in material and workmanship for one year from the date of purchase (proof of purchase required). We ask you to complete and return the enclosed Warranty Registration Form (UK). This will also enable us to keep you informed of future Quad products. Within the guarantee period, Quad will undertake replacement of defective parts free of charge provided that the failure was not caused by misuse, accident or negligence. Your statutory rights within the territory in which you purchased the equipment are not affected by this guarantee.

Quad carries out a regular review of its products and reserves the right to adjust the specifications and performance from time to time.

There are no user replaceable or serviceable parts inside this equipment. Unauthorised attempts to service or modify this product will invalidate the warranty.

SERVICE ARRANGEMENTS

If your Quad equipment requires servicing you should return it to the dealer from whom the equipment was purchased.

If you are abroad and there is no suitable dealer in your area, please contact the distributor for the country in which it was purchased or Quad Electroacoustics Ltd.

Equipment returned for service should use the original packing. You should enclose a brief note with your name and address and the reason for returning the equipment.

ACCESSORIES

Quad accessories are designed to match Quad equipment and to provide the best possible performance.

Please contact your dealer or Quad direct for further information.

Item	Order No
AC power lead 3m with Euro/13A 3 pin plug (3A fuse)	QUKES23
AC power input connector Euro/straight	PSR0413

Note: We do not supply loudspeaker cables terminated with 4mm plugs nor the 4mm plugs themselves.



INSTALLATION

The ESL loudspeaker requires an energising voltage for operation and therefore needs to be connected to an AC power supply.

Checking the AC power supply

The ESL loudspeaker is designed to operate on one range of AC power supply only, 50/60 Hz. Either 200-240V or 100/120V. The correct operating voltage is clearly marked on the base. It may be changed from 220V to 110V operation or vice versa by a suitably qualified technician.

Before connecting to the AC power supply check that the voltage range marked on the base corresponds with that of the supply.

Connecting to the AC Power Supply (UK only)

The ESL is supplied with an AC power lead with a moulded 13A 3 pin plug with 3A fuse. Do not cut off this plug or use it with its fuse cover removed. If however for any reason the plug has to be removed then it must be disposed of and **under no circumstances** plugged into a 13A socket outlet. A suitable plug can be fitted, as explained below:

IMPORTANT: Fitting a mains plug.

The wires in the mains lead are coloured:

Brown = Live Blue = Neutral

The **Brown** wire must be connected to the terminal marked **L** or coloured **Red**. The **Blue** wire must be connected to the terminal marked **N** or coloured **Black**. If the lead also has a **Green/Yellow** wire then this must be connected to the terminal marked **E** or coloured **Green** or **Green/Yellow**.

***Note:** When a fused 13A plug is used a 5A fuse (ASTA approved to BS1362) will be adequate for a typical Quad system. For other types of plug, then fit a 5A fuse either in the plug, or adaptor, or at the distribution board. If in doubt consult a qualified electrician.*

Connecting to the AC Power Supply (other markets)

The ESL should be supplied with a power lead terminated with the correct plug to match your local regulations. If the plug is an incorrect type or if you experience any problems with installation you should consult your dealer or local Quad distributor.

Connection to the Amplifier

Audio input is via binding posts. For runs up to 10m a cable with a rating of 6A (24/0.2mm) should be adequate. Longer runs may require heavier cable. The basic rule is that the total resistance of the cable should not exceed 5% of the loudspeaker impedance, ie 0.4 Ohms. Inductance should not exceed 1mH per metre and capacity can be ignored.



Each loudspeaker should be connected to its appropriate amplifier output so that the two pairs of wires are connected in the same way, to ensure that the speakers operate in phase.

Switching On and Off

The on/off switch has a rocker action; press the bottom to switch the ESL on and the top to switch it off. A **red LED** next to the on/off switch indicates that the speaker is on.

Amplifier Requirements

The ESL loudspeaker should be used with an amplifier of output capability between 20V and 30V rms (40-100W into 8 Ohms). The impedance characteristic is essentially resistive and presents no problems to the amplifier. The ESL protection circuits limit the maximum input voltage to 40V and there is no volume benefit from using an amplifier with an output greater than 30V rms (100W into 8 Ohms).

Amplifiers with an output capability in excess of 35V rms (150W into 8 Ohms approx) may be used but with caution – see **Loudspeaker Protection**.

If the Quad 405/2 power amplifier is used, the amplifier voltage limiters should not be fitted.

Loudspeaker Protection

The ESL loudspeaker is fitted with a protection circuit, incorporating a special device called a multifuse, which prevents damage from excessive programme input signals.

Should the loudspeaker be severely overdriven, for any length of time, the circuit will operate and effectively reduce the drive to the loudspeaker, causing a reduction in the volume level with some loss of quality. If this occurs, then the volume control of the amplifier should be turned down. After a delay of a few seconds to allow the circuit to reset, the volume can be increased, but only to a point below which the protection circuit initially functioned, otherwise the circuit may operate again.

Persistently overdriving the loudspeaker will cause the multifuse to completely fail, necessitating its replacement by a qualified engineer.

The above conditions are unlikely to occur in normal use or with amplifiers with a power output rating of less than 100W. Steady state signals in excess of 10V rms should not be fed to the loudspeaker.

When the AC power to the loudspeaker is switched off or disconnected, the signal input protection circuit operates to prevent excessive signals being fed to the loudspeaker elements – though care should be taken to ensure that the loudspeakers are not driven for long periods (minutes) with no AC power applied.

Positioning the Loudspeakers

However good the loudspeaker, the final results will depend very largely on the acoustic characteristics of the listening room and the position of the loudspeakers in it. Do not be afraid to experiment with both position and orientation and make a point of trying some of the less obvious as well as the more obvious positions. The benefits obtained from the time spent doing this can be very rewarding. The subject of room acoustics is complex and beyond the scope of this manual. It is assumed that the loudspeakers will be used in a room with moderate reverberation, neither too bright nor over damped. Furnishings can alter the acoustic characteristics of the listening room, and here common sense is the best guide.

The loudspeakers have constant directivity over a wide angle in both horizontal and vertical planes, so the response does not vary with the height of the listener's ears from the floor.



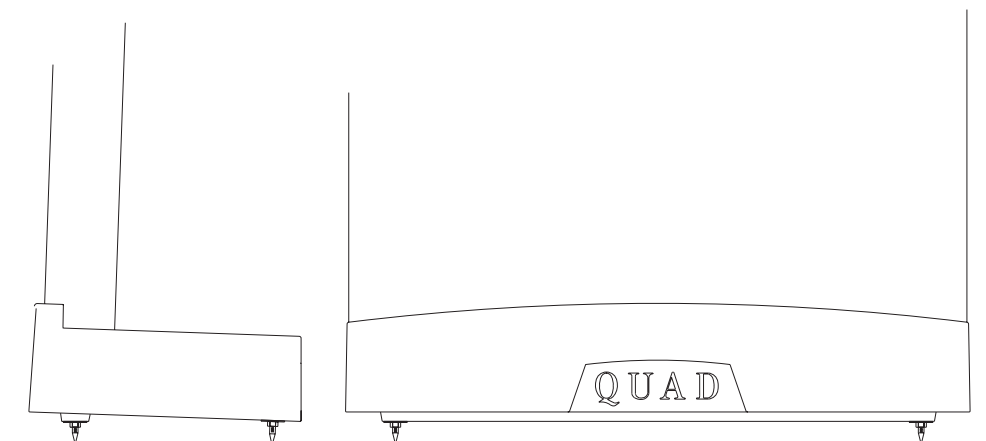
When experimenting, it is preferable to use good recordings or works with which you are familiar in the concert hall or good quality speech.

The ESL loudspeaker, being a dipole source, has considerable advantages over conventional loudspeakers in terms of room placement. No energy is radiated in the plane of the diaphragm and as a consequence, the respective axial room modes are discriminated against. Normally the loudspeaker is placed at an angle to both horizontal room axes and will excite both sets of horizontal axial modes, 3 dB less than with a conventional source and discriminate entirely against the vertical axial modes.

The loudspeakers should be placed at least 60cm (2 ft) from the rear wall of the listening room and angled towards the listener and never in corners or alcoves or behind furniture. Because the ESL is a totally homogeneous sound source it will be found that they can be placed considerably further apart than normal, broadening the stereo sound stage. Close proximity to the side walls is not detrimental to performance. Simple geometry will show that if the ESL loudspeaker is placed at an angle to the side wall, there will be no audible reflection at the listening position.

The ESLs are provided with optional floor spikes which screw into the four threaded holes in the baseplate. The heights of the individual spikes can be adjusted to ensure that the loudspeaker sits securely level on the floor.

Take care to avoid the tips of the spikes which are quite sharp.



ESL BASE AND SPIKES

Programme Material

A small note of caution. We believe that a pair of Quad ESL loudspeakers give a more realistic picture of an acoustic event than has been possible before, but only if the best source material is used. They are very revealing of faults in recording techniques and ownership of these loudspeakers will cause you to re-assess the virtues of your collection of recordings.

Loudspeaker Phasing

If there is any doubt about the way the loudspeakers are connected, their phasing can easily be checked by playing a mono source when the sound should appear to emanate from a point midway between the two loudspeakers. If this is indefinite, then the connections to one of the loudspeakers should be reversed. When correctly connected, the loudspeakers will give a definite centre sound source with more full bodied tenor and bass registers.

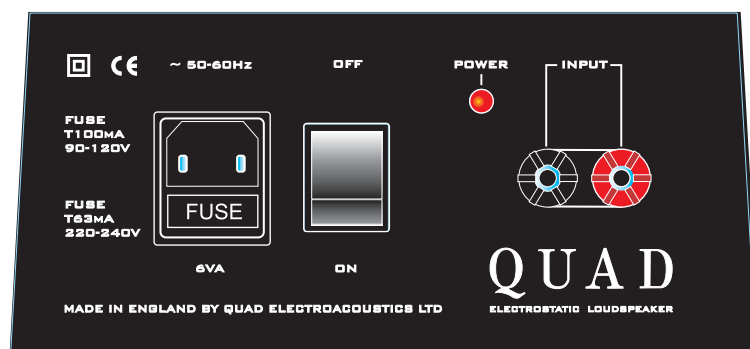


CARE AND MAINTENANCE

The grille cloth may be cleaned with a soft brush or a hand held vacuum cleaner.

They are protected against the ingress of dust etc. Periodic servicing at two year intervals is recommended to keep your speakers in pristine condition. Great care has gone into the selection of materials to ensure long term stability under a wide range of temperatures and humidity. In countries where the relative humidity regularly exceeds 90% it is recommended that the listening room be air conditioned for optimum performance.

CONNECTION PANEL





ESL-988 SPECIFICATIONS

All measurements made with a 230V AC supply.

Maximum output	2 N/m ² at 2m on axis
Sensitivity	1.5m bar per volt referred to 1m. (86 dB/2.83V rms)
Impedance	8 Ohms nominal
Maximum	Continuous input voltage (rms): 10V Programme peak for undistorted output: 40V Permitted peak input: 55V
Directivity Index	125 Hz 5.0 dB 500 Hz 6.4 dB 1 kHz 7.2 dB 8 kHz 10.6 dB
Axis band limits (low level)	-6 dB at 35 Hz 3rd order -6 dB >20 kHz
AC Input (double insulated)	220-240V or 110-120V See rating details on base of unit
Power fuse	63 mA anti-surge, 200-240V 100 mA anti-surge, 100-120V
Power consumption	6W
Dimensions	Height 94cm (including 10cm base) , width 67cm, depth 31.5cm (including terminals)approx.
Weight	Net 20.5 kg approx. Gross 23 kg approx.

The right is reserved to alter performance and specification as required.

*This equipment complies with the radio interference requirements as laid down in
EEC (European Economic Community) regulations.*



ESL-989 SPECIFICATIONS

All measurements made with a 230V AC supply.

Maximum output	2 N/m ² at 2m on axis
Sensitivity	1.5m bar per volt referred to 1m. (86 dB/2.83V rms)
Impedance	8 Ohms nominal
Maximum	Continuous input voltage (rms): 10V Programme peak for undistorted output: 40V Permitted peak input: 55V
Directivity Index	125 Hz 5.0 dB 500 Hz 6.4 dB 1 kHz 7.2 dB 8 kHz 10.6 dB
Axis band limits (low level)	-6 dB at 30 Hz 3rd order -6 dB >20 kHz
AC Input (double insulated)	220-240V or 110-120V See rating details on base of unit
Power fuse	63 mA anti-surge, 200-240V 100 mA anti-surge, 100-120V
Power consumption	6W
Dimensions	Height 133.5cm excluding feet (including 10cm base), width 67cm, depth 31.5cm including terminals approx.
Weight	Net 25.3 kg approx. Gross 28 kg approx.

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Instruction Manual for Electrostatic Loudspeakers ESL 988 and ESL 989