

INSTRUCTION BOOK

**T H E Q U A D
E L E C T R O S T A T I C
L O U D S P E A K E R**





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QUAD ELECTROSTATIC LOUDSPEAKER

This Loudspeaker is fundamentally different from other loudspeakers and it is essential that these instructions be followed if proper performance is to be obtained.

Attention is drawn to the heavy type on page 5 and page 10. These two points in particular must receive attention before any attempt is made to use the loudspeaker for listening.

ASSEMBLY

The Loudspeaker pack contains :—

- The Loudspeaker
- 3 legs
- 12 screws
- 2 signal plugs
- 1 mains plug
- 1 Instruction Booklet

The legs are removed to avoid damage in transit, etc., and should be re-assembled before the loudspeaker is put into use. The three legs are not interchangeable. The one with the different off-set angle is the rear leg and when in position it should point towards the rear. The remaining two legs are slightly off-set right and left respectively. They should be mounted so that they

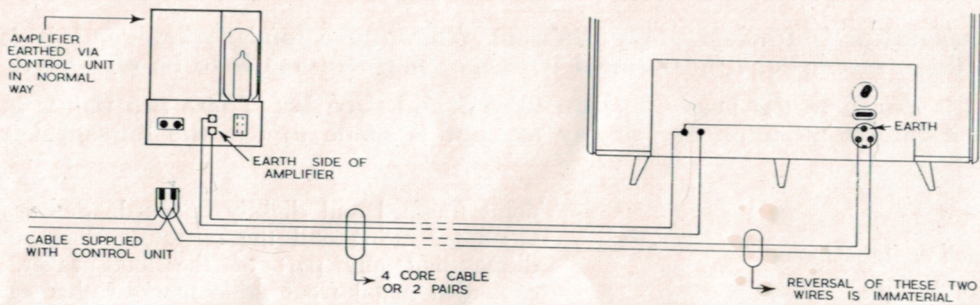
point forward and slightly outward. Screws are provided for fixing and the operation does not involve dismantling any part of the loudspeaker. As the expanded metal front grille marks rather easily, it is recommended that care be exercised when laying the speaker down on its face.

CONNECTING

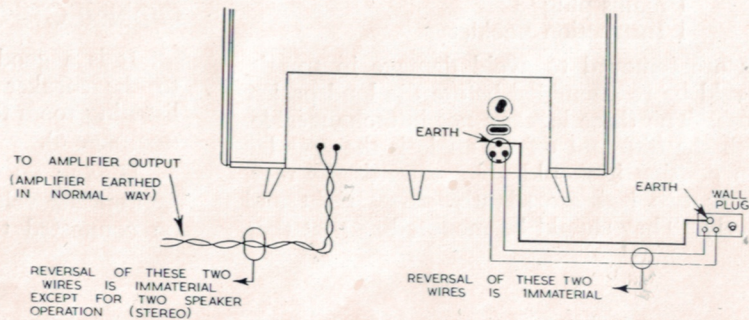
It is a good plan to connect temporary long leads to the speaker so that it may be moved round the listening room to find the optimum position for listening (see page 5).

Having set the voltage adjustment tapping to the appropriate voltage the AC mains and earth leads can be connected to the three pin socket provided. The

RECOMMENDED CONNECTIONS FOR AUTOMATIC SWITCHING FROM AMPLIFIER



ALTERNATIVE CONNECTIONS



three connections are marked inside the cable end connector L, N and E, corresponding to live, neutral and earth respectively. It will probably be found most convenient to connect a pair of wires to L and N and to connect their other end to the two pin cable-end mains socket leading into the main amplifier. In this way the loudspeaker power supply will be switched on and off by the amplifier volume control switch.

The E connection should be taken to any convenient earth point. As the amplifier should already be earthed, it may be convenient to connect the E terminal to the "earthy side" of the signal input to the loudspeaker (since this is already earthed in the amplifier).

As with any mains operated apparatus, the services of a competent electrician should be sought if there is any doubt.

The signal output from the amplifier is connected to the sockets provided on the back of the loudspeaker. The phasing (which way round) is immaterial except for instances where more than one loudspeaker is used in the same room—stereophonic reproduction for example.

The signal and the mains supply may be carried on a multiple four or five core cable and in most cases this will be the most convenient method.

The thickness of the wire carrying the signal can be of the calibre of ordinary lighting flex for lengths up to 20 or 30 ft. For longer runs correspondingly thicker cable should be used.

SWITCHING ON

The indicator lamp above the mains plug should glow upon switching on, and the loudspeaker will be reasonably well charged by the time the amplifier has warmed up assuming both to be switched on simultaneously. It can thus be used immediately although the frequency response and maximum power may not be strictly correct for the first few minutes.

ROOM POSITION

The effect of room position is entirely different with this loudspeaker from that with a conventional speaker.

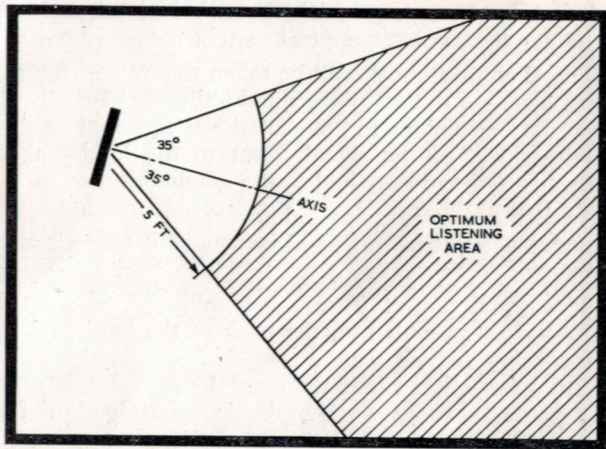
THE LOUDSPEAKER SHOULD NOT BE PLACED CLOSE TO CORNERS OR WALLS. While a corner position accentuates low frequencies with conventional loudspeakers such a position with the QUAD Electrostatic will reduce the bass seriously and will cause deterioration of middle frequencies due to standing waves. Similar remarks apply when the loudspeaker is placed parallel with and close to a wall.

As a general guide the loudspeaker should not be closer than 2 ft. to any parallel wall, nor closer than 3 ft. to any corner. Again as a general guide the loudspeaker should be so placed that there is a minimum of restriction of the sound waves emanating from the front and the back.

Provided attention is given to the previous paragraph it will be found that the loudspeaker performance is very little influenced by the acoustics of the room. This is because the sound radiation is a function of direction at all frequencies and the room resonances are excited to a very much less extent than with conventional loudspeakers for the same level of direct radiation.

The best position for the loudspeaker may now be chosen and should be that which gives the best perspective. The objective on a concert programme is that the loudspeaker should appear as an open window beyond which lies the Concert Hall. The "closeness" of the orchestra is dependent upon the acoustics and microphone placing at the transmitting end. With modern studio practice the window should appear to open into a position about halfway down an idealised Concert Hall (front row — dress circle). Of course, in these tests for optimum perspective, the volume level must be adjusted with care so that the intensity is commensurate with the perspective as broadcast or recorded (see page

7). It is practically impossible to predict which position in a room is likely to be the best and time spent in trying the loudspeaker in all possible positions is usually very well worth while. Two symmetrical positions in an apparently symmetrical room do not necessarily give similar results.



Possible positions should take into account that the listeners should be within 35° of the loudspeaker axis and not closer than 5 ft. (see figure above).

THE LOUDSPEAKER AND THE CONTROL UNIT

At first thought it would appear that the purpose of a volume control is solely to enable the listener to have his music loud or soft according to his whim. Whilst it, of course, fills this requirement, it has a further purpose—that of adjusting the intensity of sound so that it is correctly related to the perspective as recorded or broadcast.

If a voice is picked up close to a microphone in a very absorbent studio, then on reproduction that voice will take up a position at the centre of, and in the plane of the loudspeaker. For natural sound, therefore, the loudspeaker should radiate similar power to that of the original voice. If on the other hand the voice is picked up some way from the microphone in a more live studio, then the voice on reproduction will take up a position through the loudspeaker and a considerable distance behind it. It is clear that the power required for the loudspeaker for natural sound is now very much less than in the first case. The *position* or *perspective* of the reproduced sound is fixed at the studio end and there is little that can be done at the listening end to alter it. It

follows that the volume setting for natural sound is to a large extent fixed at the studio end.

Studio monitoring is usually carried out at a reasonable level and the whole aim is to produce listening as from a favourable seat in the Concert Hall. Adjusting the volume control to a level to give this correct acoustic perspective will produce the most natural reproduction. The level is usually such that it is quite possible to speak to a person sitting next to the listener without raising the voice or turning down the sound level — as indeed this is possible in the Concert Hall.

Raising the level to “bring the orchestra into the room” or turning it down to a low background will both distort the perspective, although this may have to be tolerated on certain occasions. It should be pointed out that no amount of tone control or loudness control can affect the perspective, although these effects can be used to produce a new sound which although quite unlike the original is sometimes found acceptable.

Popular music is often recorded or transmitted with close microphone technique and would therefore tend to require reproduction at higher levels. It is in fact generally monitored at a higher level. There are a

number of other factors which have a strong bearing on optimum listening levels but it is outside the scope of this handbook to deal with these adequately. It will be realised that the volume control setting should receive careful attention and it can be emphasised that much listening is spoilt due to insufficient care on this point.

Radio on V.H.F.

With the QUAD Electrostatic Loudspeaker used with B.B.C. broadcasts, it is recommended that no tone controls or filters be used, and they may be conveniently switched out of circuit by using the CANCEL position on the Control Unit. The greatest care is taken during transmission and only rarely can this quality be improved at the listening end.

It can be argued that some broadcasts are inferior in quality and that these can be improved by judicious use of tone control. Whilst this is true, such broadcasts are usually confined to those where the subject matter and not the quality is important.

Gramophone Records

The reproduction of gramophone records is a matter of compromise if the best performance is to be obtained.

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There are many makes of records and almost without exception a programme is fed through various variable tone controls during the making of the record in order to obtain the effect which the manufacturer considers desirable. It is therefore understandable that there will be considerable variation in tonal balance among the recordings offered to the public (this variation in balance is not to be confused with the recording characteristic. This latter is fully corrected by using the correct push button combinations as shown by the chart provided with the QUAD II amplifier).

Musical balance should be adjusted if required by means of the treble and bass controls, referring to CANCEL to ensure that any adjustments are truly an improvement. Few modern recordings will require more than plus or minus 2 on bass or treble controls and the best recordings should require no adjustment at all.

Virtually all recordings, even the latest and best, will require some degree of filtering for the best possible quality. This is no reflection on the recordings themselves but is an inherent feature of the disc system of reproduction.

The higher the frequency the less easily can the stylus trace the groove, hence tracing distortions (and noise) increase. As the frequency increases, therefore, the ratio of musical content to unwanted sound reduces. Minimum distortion is obtained when the filter slope corresponds to the slope of the distortion rise. This will vary with the type of musical content and the recording level.

With the best recording the filter should be set to 10K and with the slope initially at level, the slope control should be rotated until the reproduction is clean yet without sacrificing any other aspect of quality. The optimum will usually be found somewhere between LEVEL and 15. With many good modern recordings the same procedure should be applied with the filter set to 7 K.

Older recordings and 78 r.p.m. recordings will usually require the filter at 5 K with more severe settings of the filter slope.

The filter controls are very carefully designed and their correct use is important in obtaining a satisfactory musical sound.

STEREO REPRODUCTION

Two loudspeakers may be used for stereophonic reproduction but experience obtained so far is insufficient to enable us to make specific recommendations.

It would appear, however, that the directional characteristic particularly at middle and low frequencies may assist in obtaining good stereo over a larger listening angle than more omni directional sources.

In any given room the best arrangement has to be found by experiment.

LARGE ROOMS

In rooms much larger than 5,000 cubic feet, with wood floor, wood panelling or normal absorbent fittings, the reproduction will be unsatisfactory. This is because the loudspeaker will not excite the room reverberation in proportion to the direct sound. The ratio of direct to reflected sound will be too low and the sound will appear to lack size.

This can only be overcome by using two loudspeakers placed with their planes at an angle to each other.

An exception occurs with large rooms of concrete construction with little furnishing. Such rooms are so reverberant that reproduction is normally extremely difficult. Here the directional characteristics are a help and lack of room excitation can result in an improvement over a conventional system.

As a rule the QUAD Electrostatic is not recommended for rooms larger than 5,000 cubic feet.

MAINTENANCE

The loudspeaker requires no maintenance. In the event of a fault the loudspeaker should be returned to the manufacturers or their agent.

The pilot lamp at the rear indicates that the AC mains is reaching the loudspeaker.

AMPLIFIER REQUIREMENTS

THE LOUDSPEAKER IS DESIGNED FOR USE WITH THE QUAD II POWER AMPLIFIER. OTHER AMPLIFIERS MAY BE USED PROVIDED THEY ARE DESIGNED TO MEET, OR MODIFIED TO MEET CERTAIN REQUIREMENTS.

The notes in this section are for the guidance of amplifier designers and those concerned with such modifications.

- (a) The amplifier should be capable of delivering at least 15 watts at low distortion when a resistive load is varied between 30 and 7 ohms.
- (b) The amplifier should be statically and dynamically stable completely independent of the resistance and reactance of the load. An inductance of 10 μH may be inserted in series with the load during these tests.
- (c) The loudspeaker appears as 15 ohms over most of the frequency range and this will be the optimum matching. However, the impedance rises to 30 ohms over a small band and it is necessary to ensure that with this load (30 ohms) the amplifier cannot deliver more than 35 peak volts across the loudspeaker terminals.
- (d) The source impedance of the amplifier should appear as 1 to 2 ohms in series with 30 - 40 μH . Should it be less than either of these figures it may of course be padded out and this may in turn assist amplifier stability (see b_1 above).

Even though the amplifier may not go unstable, failure to provide the correct source impedance will result in an incorrect frequency response from the loudspeaker at high frequencies.

It is sufficient to check the source impedance by measuring the regulation at various frequencies. However, if it is required to check that a level response is being fed to the loudspeaker this should not be done at the output of the amplifier or input to the loudspeaker. This point is mid-way between two inductances and will give a mis-leading reading.

To check response it is necessary to remove the back of the loudspeaker and to detach the matching unit, which is on the left-hand side and attached to the

cabinet by four screws through the base of the frame.

A balanced valve voltmeter or balanced oscilloscope should be connected across the two terminals to which the brown wires are attached. Here the signal is in push-pull with centre tap earthed. The impedance of the measuring device should not be less than 5 megohms and capacity not more than 20 pF. With a 1,000 cycles input to the amplifier the volume control should be slowly increased from zero to give 100 volts rms. across the measuring equipment. With constant input to the amplifier, the voltage at the measuring device should be level up to 7 Kc/s, slowly increasing above this to plus 3 dB at 16 Kc/s. Above 16 Kc/s the response should fall, being about plus 1 to plus 2 dB at 20 Kc/s.

